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PART V

DEPARTMENT OF LABOR

Occupational Safety and Health Administration

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MEANS OF EGRESS; HAZARDOUS MATERIALS; AND FIRE PROTECTION

Proposed Amendments and Revisions to Safety Standards

[4510-26-M]

DEPARTMENT OF LABOR

Occupational Safety and Health Administration

[29 CFR Part 1910]

[Docket No. S-004]

OCCUPATIONAL SAFETY AND HEALTH STANDARDS

Means of Egress; Hazardous Materials and Fire Protection; Proposed Amendments and Revisions

AGENCY: Occupational Safety and Health Administration (OSHA), U.S. Department of Labor.

ACTION: Proposed Rulemaking.

SUMMARY: This notice contains proposed changes to three subparts in the present OSHA safety standards found in 29 CFR Part 1910. The specific subparts to be amended or revised are Subpart E—Means of Egress, Subpart H—Hazardous Materials, and Subpart L—Fire Protection.

The standards in Subpart E regulate the means of egress (emergency exits) from workplaces. The standards in Subpart H regulate the storage, handling and use of compressed gases (oxygen, hydrogen, and acetylene), flammable and combustible liquids, coating operations using flammable and combustible liquids (spraying and dipping), explosives and blasting agents, and the storage and handling of liquefied petroleum gases and anhydrous ammonia. The standards in Subpart L regulate portable fire suppression equipment (portable fire extinguishers and standpipe systems), fixed fire suppression systems (automatic sprinkler systems and various other fixed extinguishing systems), and local fire alarm signaling systems.

In Subpart E, OSHA proposes to change the wording of § 1910.37(n) to reference the applicable section of the proposed revision to Subpart L. Further, OSHA proposes to add two new definitions for terms used in Subpart E. Finally, OSHA proposes a new section, "Employee Fire Safety Plans," which would regulate the emergency action plan and the fire prevention plan that would be required in the proposed revisions to Subpart L. The changes proposed for Subpart E are predicated upon the proposed revisions to Subpart L. If the applicable sections in the proposed revisions to Subpart L are not adopted, these changes to Subpart E would not be necessary.

In Subpart H, OSHA proposes to amend the wording of certain provisions by changing the current references to certain National Fire Protection Association (NFPA) standards to references to the applicable sections of the Subpart L proposal. These changes are necessary to coordinate referencing between Subparts H and L and will eliminate incorporation by reference in Subpart H. The Subpart H amendments, like those in Subpart E, are predicated upon the proposed changes to Subpart L.

In Subpart L, OSHA proposes to revise the present subpart for two reasons. First, it is necessary to update the present provisions which have been in effect since 1971. Since 1971 several changes have been made to the source national consensus standards and OSHA has received extensive comments from many affected parties concerning the effectiveness, applicability and relevance of the existing standards. OSHA's enforcement experience has revealed difficulties with certain provisions of Subpart L. Second, the Secretary of Labor and the Assistant Secretary for Occupational Safety and Health have expressed their commitment to undertake a thorough review of the agency's regulatory policy and to redirect its efforts toward more significant safety and health hazards. This proposal is part of that continuing commitment to reexamine the agency's regulatory activites and to set standards which more effectively achieve the goal and purpose of the Occupational Safety and Health Act.

DATES: Comments on these proposed rules must be received by March 16, 1979.

Requests for a hearing must also be received by March 16, 1979.

ADDRESS: Comments and requests should be sent to: Docket Officer, Docket S-004, Room S6212, U.S. Department of Labor, Washington, D.C. 20210.

FOR FURTHER INFORMATION CONTACT:

Mr. Michael B. Moore, Occupational Safety and Health Administration, Room N-3463, U.S. Department of Labor, Washington, D.C. 20210, 202-523-7225.

SUPPLEMENTARY INFORMATION

I. HISTORY.

Under section 6(a) of the Occupational Safety and Health Act of 1970 (the Act), Congress directed OSHA to promulgate safety and health standards from existing national consensus standards and established Federal standards. On May 29, 1971, OSHA promulgated its first occupational safety and health standards in 29 CFR Part 1910 (36 FR 10466). Subparts E, H, and L were included in this publication and became effective on August 27, 1971 and February 15, 1972.

After the initial standards package was promulgated, OSHA found it necessary to amend specific provisions of the standards. For example, on January 9, 1974, at 39 FR 1437, Table L-3 in Subpart L was amended to permit 12-year hydrostatic test intervals for fire extinguishers with aluminum shells and § 1910.158(b)(3) was changed to extend the maximum lengths of fire hose to be used on standpipe systems. These changes were made to permit acceptable alternatives to the practices required in the standards.

During this period of time, OSHA received petitions calling for the recognition of other methods of providing employee safety than those contained in the original set of standards and for the amendment of its standards to cover only occupational safety and health concerns.

In 1975, OSHA decided to review Subpart L to determine if revision was necessary. A revision would reflect the changes made in the source national consensus standards and would respond to the petitions which had been received. On April 23, 1976, OSHA published a notice in the FEDERAL REGISTER at 41 FR 17255 announcing a standards revision procedure and requesting information and participation in public meetings relevant to revising Subpart L. The agency raised several general and specific issues at that time and invited the public to submit written comments on the issues presented prior to June 23, 1976. That deadline was later extended to July 20, 1976. In addition to the request for written comment, the agency held three separate public meetings in San Francisco, Dallas, and Boston during June 1976. The purpose of those meetings was to afford the public an opportunity to present oral as well as written comments concerning the issues raised in the April 23, 1976 FEDERAL REGISTER notice. The written comments received and the transcripts of these meetings and related exhibits have been entered into the OSHA record for this proposed rulemaking.

Upon completion of the public meetings and the close of the comment period, OSHA reviewed all the data presented and determined that the revision of Subpart L was necessary.

This notice contains proposed revisions and is applicable only to general industry workplaces. The maritime, construction and agricultural industries are covered by standards in separate parts of Chapter XVII of Title 29 of the Code of Federal Regulations.

In early 1977, OSHA initiated a program to revoke certain general industry standards which were determined to be unrelated to employee safety. In general, the standards selected for revoction were among those which were obsolete or inconsequential, concerned with comfort or convenience, directed

toward public safety or property protection, subject to enforcement by other regulatory agencies, contingent on manufacturers' approval or recommendations, encumbered by unnecessary detail or adequately covered by other general standards. The list of proposed revocations was published in the FEDERAL REGISTER at 42 FR 62734 on December 13, 1977 and the public was given an opportunity to present their views on the proposal. Certain provisions of Subparts E, H and L contained in this notice of proposed rulemaking were included in the December 13, 1977 notice.

On October 24, 1978 OSHA published a notice in the FEDERAL REGISTER at 43 FR 49726 revoking certain standards which OSHA determined could be revoked without adversely affecting employee safety and health. The standards which were revoked on October 24, 1978, have not been addressed in this notice.

II. BACKGROUND

(1) PHILOSOPHY

During the development of this proposal many persons have questioned the need for a standard covering fire protection equipment and practices in the workplace.

There are two contrasting points of view concerning OSHA's involvement in fire protection in the workplace. The first is that the hazards to employees when they are permitted to fight fires with equipment required by OSHA is too great and that employees should be evacuated from the fire scene to prevent injury or loss of life. Proponents of this philosophy believe that in requiring fire protection equipment, OSHA permits employees to be exposed to a hazardous situation and that this is contrary to the purposes of the Act. These persons believe that firefighting is better left to the municipal or county firefighter.

The second point of view is that some fire protection by trained employees is necessary for the welfare of the employee, the employer and the economy. The proponents of this philosophy believe that since firefighting is necessary to protect life and property, the tools and equipment to be used by trained employees should be regulated so that they are maintained and installed in a safe and reliable manner.

OSHA believes that there is a definite life safety hazard associated with fire in the workplace. OSHA recognizes that there is a need for employees to fight fires in workplaces, especially where no public fire protection service is available or where available service is inadequate. The purpose of Subpart L is to provide standards for fire protection equipment and practices so that employees are protected from the hazards associated with fire in the workplace when the employees must provide fire protection services.

(2) ISSUES

In its FEDERAL REGISTER notice of April 23, 1976, OSHA raised several issues related to safety and fire protection. The notice requested written comments on the issues.

Comments received in response to the notice where used in the development of this proposal. OSHA now invites comments on this proposal to assist in the development of the final standard.

A summary of the major responses to the April 1976 FEDERAL REGISTER notice is given below:

1. *Whether particular standards contained in Subpart L should be revoked because they have little, if any, relevance to employee safety in the workplace and relate to property protection or safety of the general public?* OSHA received many comments addressing this issue. Most of the comments supported revision of the subpart rather than a total revocation. The comments calling for total revocation stated that the standards in Subpart L are property protection oriented and lack relevance to employee safety. The comments calling for revision recognized the need for the standards, but cited several problem areas and difficulties such as out-of-date standards. OSHA is proposing to revise the standards and believes that most of the property protection oriented standards have been revoked through the FEDERAL REGISTER notice published on October 24, 1978. This proposal should eliminate all other property protection standards.

2. *Whether particular provisions of the standards need simplification or clarification?* Almost all of the comments received on this issue called for simplification and clarification. Comments substantiate the position that simplified standards would require less interpretation by eliminating ambiguous language. This in turn would lead to more uniform enforcement. In light of the comments and in furtherance of OSHA's commitment to promulgate more effective standards, OSHA believes that Subpart L should be revised to be clearer and easier to understand. We have included a proposed appendix to enhance understanding of Subpart L.

3. *Whether particular provisions of Subpart L should set forth specifications which must be met by employers or should, rather, require a level of performance which would ensure employee safety without requiring specific means of meeting that performance level?* The majority of comments received on this issue called for performance-type standards. Supporters of performance language cited the flexibility provided by such language as being advantageous. Those commenters who wanted specification-type standards indicated that they wanted to be told specifically what to do. In order to attain a goal of flexibility OSHA is proposing a performance-type revision to Subpart L. For those persons who want to know exactly what to do to assure they are in compliance, OSHA proposes a nonmandatory appendix of compliance guidelines.

4. *Whether there are any gaps in OSHA's coverage of fire protection which could lead to unsafe working conditions?* Several gaps were identified in the comments. The two most frequently cited were the lack of training for persons expected to use fire protection equipment and the lack of personal protective equipment standards for fire brigade members. OSHA has addressed all of the gaps identified in the comments.

5. *How should ANSI and NFPA standards be utilized in Subpart L?* Most commenters stated that OSHA should continue using the national consensus standards but that we should incorporate them by reference. Other commenters cited OSHA's inability to keep up with current editions of the source standards as being disadvantageous to the program. OSHA is proposing to use the source standards as nonmandatory compliance guidelines and to include them in the appendix to the standards. These guidelines would supplement the performance-type standards proposed in the revision. As discussed more fully below, since these guidelines are nonmandatory and only established one of several possible ways of complying with the mandatory performance standards, they could be changed or added to as new procedures are developed without rulemaking.

6. *Whether Subpart L should, in and of itself, require the use of fixed and portable fire suppression and alarm systems and equipment, or whether it should simply be referenced when fire protection devices are required by other OSHA standards?* Comments stated that OSHA's fire protection standards should apply only to those systems required by the present Subpart L standards.

OSHA is proposing that Subpart L contain the design and installation criteria for fire protection equipment and systems. The proposed standards could be referenced for their criteria when fire protection systems or equipment are required in OSHA standards. For example, if an OSHA standard were to require the installation of a particular fire protection system, that standard could reference Subpart L for design and installation criteria in-

stead of having to state them in the standard.

7. *Whether OSHA should continue to allow the use of inverting type portable fire extinguishers?* Some commenters stated that OSHA should phase-out these types of units. Other commenters stated that only certain types of these units should be phased out. However, some comments stated that the units are not hazardous as long as they are properly inspected and maintained. OSHA agrees with those commenters who believe that certain units are not hazardous if properly maintained and inspected; however, other types of units can be subjected to metal fatigue and creep under the pressure of hydrostatic testing or use. It is this type of fatigue that can lead to rupture of the unit and possible injury or death to employees. For this reason OSHA has proposed the phase-out of soldered or riveted shell inverting type units.

8. *Whether OSHA should prohibit carbon tetrachloride and chlorobromomethane?* The majority of commenters called for the prohibition of these units because of the toxic byproducts which are generated when the agent strikes hot metal surfaces. The agents have also been shown to be toxic when inhaled, absorbed or otherwise taken into the body. Injury data received in support of the comments further supports prohibition. Only a few comments state there is no hazard associated with these chemicals if they are used in properly ventilated areas. OSHA agrees with the majority of commenters and is proposing the prohibition of the use of these chemicals as extinguishing agents because of their toxicity. In addition, other safer agents are readily available.

9. *Whether OSHA should require a mounting height of portable fire extinguishers and, if so, what should it be?* In the FEDERAL REGISTER notice of October 24, 1978, OSHA revoked paragraph 1910.157(a)(6) which required a specific mounting height for portable fire extinguishers. OSHA is proposing a performance requirement that portable fire extinguishers be accessible to employees.

10. *Whether OSHA should accept fixed automatic fire extinguishing systems in lieu of portable fire extinguishers?* Comments indicated that portable equipment complements fixed systems and should be used in conjunction with fixed systems. OSHA is proposing a set of standards which would be applicable to both fixed and portable extinguishing systems. The appropriate system to be used in any particular case would depend on the specific hazard situation and on the requirements of the standards covering the type of situation.

11. *Whether portable fire extinguishers should be required only along the means of egress routes so that they should only be used to aid employess in escaping from the hazards?* Many comments stated that portable units should be distributed throughout the workplace because more effective protection is provided through shorter travel distances. Other comments stated that employees retrieving units mounted along the means of egress would interfere with orderly evacuation of other employees. OSHA agrees with those commenters who believe that such placement would interfere with the evacuation of employees. Further, placement of extinguishers along the means of egress could lead to placement of units throughout the workplace because, for some employees, the means of egress would carry them through the building. Therefore, OSHA is proposing to require the placement of fire extinguishers at locations where they will be readily accessible to employees who are to use them. This would include special hand trucks or powered vehicles located where members of the plant fire brigade can reach them at the time of a fire emergency.

12. *Whether OSHA should require variable stream nozzles with shut-offs?* The majority of comments received on this issue indicated the need for shut-off nozzles to give employees control of the water supply at the nozzle-end of a hose line. Employee injury due to contact with "whipping" hose can occur when employees lay a flowing open bore nozzle on the ground. Other commenters believed that open bore nozzles can provide adequate employee safety if used by trained employees. OSHA is proposing to require shut-off nozzles because they give the nozzle operator more control of the water supply. While a variable stream nozzle having the capability to vary a water stream from a fog to a straight stream provides a highly effective piece of fire fighting equipment, OSHA does not believe they are necessary in all installations. Therefore, OSHA is not proposing a requirement for variable stream nozzles.

13. *Whether OSHA should accept a hose system in lieu of portable fire extinguishers, and, if so, what type?* Many comments stated that small-hose (1-½") installed in accordance with the applicable NFPA standard can provide employee protection equivalent to that provided by portable fire extinguishers. Supporters cited factors such as increased water supply and extended reach of the hose stream as advantageous. OSHA is proposing to accept portable fire hose systems in lieu of portable fire extinguishers since fire hose systems have a greater water supply and because of the extended range of the hose systems over portable fire extinguishers covering the same area.

14. *Whether unlined linen or hemp hose should be prohibited by OSHA?* Some comments called for the prohibition of such hose because existing standards do not contain adequate requirements for inspection and maintenance of standpipe hose systems. Other comments stated that such hose is adequate if properly maintained and inspected. OSHA is proposing the prohibition of such hose when it becomes defective and can no longer provide service.

15. *Whether OSHA should establish maintenance and testing requirements for fire hose, and if so, what should they be?* Many comments called for some type of maintenance and testing requirements to assure the reliability of the hose. Comments cited field experience with fire hose which contains holes caused by poor maintenance. To limit the possibility of employee injury due to the existence of defective hose, OSHA is proposing to adopt the appropriate requirements of the NFPA standards for maintenance and inspection of fire hose.

16. *Whether total flooding systems using agents hazardous to employees should be regulated by OSHA; and if so, whether predischarge alarms, evacuation and rescue plans, and maintenance requirements should be addressed?* Comments supported the need for safety devices on total flooding systems to ensure employee safety in areas protected by total flooding systems using hazardous agents. Comments suggested the use of such devices as predischarge alarms and rescue equipment. Where there is the possibility of employee entrapment in areas which are protected by this type of fixed systems, OSHA is proposing to require predischarge alarms, instruction signs, and employee rescue equipment. In order to assure the reliability of this equipment, OSHA is also proposing maintenance and testing requirements for the equipment.

17. *Whether OSHA should allow alternatives to manual pullbox alarms such as whistles, voice, visual or tactile communication systems?* Almost all of the comments addressing this issue supported alternative methods of providing employee alarms. Comments gave examples of the appropriateness of visual alarms in areas where persons have difficulty hearing and tactile alarms where persons may be unable to see or hear present alarm systems. Other comments stated that alarms such as steam whistles and air horns are in use at the present time and can provide adequate safety. In consideration of the comments, OSHA is proposing to accept alternative alarm systems.

18. *Whether OSHA requirements for frequent tests of fire alarm signal systems are necessary when the systems are provided with supervisory circuits? How often should unsupervised systems be tested?* Several comments started that the weekly test requirement is too burdensome because of its frequency. Comments suggested that the test interval be every two months. In recognition of the comments presented, OSHA is proposing a two-month test interval for all alarm systems. This would assure the reliability of the system without presenting an unnecessary burden on employers.

19. *Whether a single universal fire evacuation signal should be required, and if so, what should it be?* Comments addressing this issue urged OSHA to delay such a requirement as it is still being studied and debated on an international level. As there has been no determination made of what type of signal would be required and because installation of such a signal would involve retrofitting existing workplaces, OSHA has not proposed a single universal fire evacuation signal at this time.

In addition to the above issues on which OSHA invites further public comment, several other issues are also relevant to the proposal. Therefore, OSHA is also seeking comment, information and evidence on the following issues:

a. Whether employees should be permitted to be exposed to concentrations of slightly toxic extinguishing agents and, if so, what should the maximum exposure level be?

b. Whether smoke-vents can contribute to employee safety during a fire emergency? If so, should OSHA have requirements for them?

c. Whether portable fire extinguishers should be permitted to be placed directly on the floor surface in certain locations where the floor remains dry and free of corrosive agents?

d. Whether single source water supplies for sprinkler, standpipe, and water spray systems are adequate for employee safety and, if so, in what type of workplaces?

e. Whether OSHA should phase-out all types of soda-acid and foam inverting-type extinguishers or only those with riveted or soldered brass shells?

f. Whether small garden type or booster type hose (⅝" to 1") can provide adequate fire control for incipient stage fires in lieu of small hose (1½") as proposed in this standard?

g. Whether the impact testing of head protective devices in accordance with the NFPCA document, "Model Performance Criteria for Structural Firefighters' Helmets, August 1977" is adequate with respect to impact at the top of the head protective device, or should OSHA, in addition, continue to require impact testing in accordance with ANSI Z89.1, *Requirements for Industrial Head Protection?*

h. Whether the circulating air oven test for heat resistance of protective head devices as contained in the NFPCA document, "Model Performance Criteria for Structural Firefighters' Helmets" is adequate or should the test procedure be more detailed?

i. Whether the proposed training requirements for brigade members are adequate and, if not, what constitutes an adequate training program for members of a fire brigade?

j. Whether OSHA should establish test procedures and performance levels for high temperature criteria for self-contained breathing apparatus used by firefighters and, if so, what should they be?

k. Whether the proposed standard for fire brigades should include test criteria for gloves which address cut resistance and thermal insulation against radiant heat energy? If the test criteria should be included, is the test method contained in the NIOSH publication "Development of Criteria for Firefighters' Gloves; Volume II: Glove Criteria and Test Methods, 1976" sufficient, or should other test criteria be developed?

l. Whether OSHA should require all total flooding extinguishing systems to be equipped with supervisory monitoring systems?

(3) THE STANDARD'S NEW FORMAT

OSHA is proposing a new format for the standards which are being revised. The format is presented for the first time in this proposal and consists, in general, of performance type standards accompanied by a nonmandatory appendix of compliance guidelines and additional information. This new format has been developed as a result of OSHA's efforts to promulgate performance type standards while providing specific compliance guidelines and as a response to suggestions offered by the public during the comment period following OSHA's April 23, 1976 notice in the FEDERAL REGISTER.

OSHA has received considerable comment in the past about the problems associated with standards which, for example, set specific mounting heights for fire extinguishers, specific heights for guardrails, specific distances between flammable liquid storage tanks and other similarly detailed specifications. Many of the commenters have complained about the extra expense they have incurred when moving extinguishers or raising guardrails mere inches to comply with OSHA standards when the method they had previously used provided adequate employee safety. In order to resolve many of the problems associated with specification standards, OSHA has considered using performance type standards whenever possible or otherwise provide flexibility for compliance in this proposal.

However, there are cases when specifications are necessary to achieve the goals of employee safety. Some commenters have complained that their biggest problem with OSHA standards is not knowing exactly what is expected of them. These commenters ndicate they need specifications to be able to measure their success in complying with OSHA's standards and to minimize different interpretations. Generally, these commenters are small businesses without the safety expertise found in larger corporate safety staffs. In order to provide the employer and employee with additional information and to provide guidelines for compliance, OSHA is considering the use of a nonmandatory appendix containing various methods of compliance that an employer could use to comply with the intent of the OSHA standard.

OSHA is presenting this proposal in the new format so that interested parties may comment on the usefulness and practicality of such a format. The mandatory standard itself would contain performance or goal-oriented language directed at providing compliance flexibility and the nonmandatory appendix would contain guidelines directed at providing some methods of compliance which would meet the intent of the OSHA performance standard.

It is emphasized that the appendix is nonmandatory and is provided for guidance. It is intended to provide useful, explanatory material and information to employers and employees to aid in understanding and complying with the standards. The information contained in the appendix does not create any additional obligations or detract from any obligations of the standard. In view of the nature of the appendix, changes could subsequently be made without rulemaking.

III. SUMMARY AND EXPLANATION OF THE PROPOSAL

(1) SUBPART E—MEANS OF EGRESS

Section 1910.35—Definitions. OSHA is proposing to add two new definitions to § 1910.35. In new paragraph (i), OHSA proposes to define the term "emergency action plan." In paragraph (j), OSHA proposes to define the term "emergency escape." These paragraphs define new terms used in the proposal.

Section 1910.37—Means of egress, general. OSHA is proposing to amend paragraph 1910.37 (n) to reference Subpart L for maintenance and testing criteria for fire alarm signaling systems. This proposal would eliminate the need for employers and employees

to refer to a second document to determine the requirements.

Section 1910.38—Employee emergency plans. Section 1910.38 is presently titled "Specific means of egress requirements by occupancy" and is reserved. OSHA proposes to change the title to "Employee emergency plans" and to propose standards in this section for employee action plans and fire prevention plans.

In paragraph (a), Emergency action plans, the proposal contains the standards necessary for the employer to develop an emergency action plan which would satisfy the exemption criteria in § 1910.157 or other requirements of Subpart L. The emergency action plan would consist of and address all designated actions and duties incumbent upon employers and employees to ensure employee safety during an emergency evacuation from a workplace where an emergency hazard exists. The proposed section contains requirements for the plan's elements and its implementation. It also calls for alarm systems, training, and total or partial evacuation at the time of emergency.

In paragraph (b), Fire prevention plan, the proposal contains the standards necessary to minimize unwanted fires in the workplace. It would address all areas of the workplace where combustibles may accumulate in order to control or prevent the likelihood of unwanted fire. The proposed section contains the elements of a fire prevention plan and requirements for housekeeping, training and maintenance of fire suppression systems.

These two new paragraphs are necessary to provide regulation of employee fire safety plans which can be used in complying with the proposed requirements of Subpart L.

(2) SUBPART H—HAZARDOUS MATERIALS

Section 1910.107—Spray finishing using flammable and combustible materials. In paragraph 1910.107(f)(1) OSHA proposes to change the referenced standard from NFPA 13-1969 to 29 CFR 1910.159.

Section 1910.108—Dip tanks containing flammable or combustible liquids. In paragraph 1910.108(g)(1) OSHA proposes to change the referenced standard from NFPA 10-1970 to 29 CFR 1910.157.

In Paragraph 1910.108(g)(2) OSHA proposes to change the referenced standard from NFPA 15-1969 to 29 CFR 1910.163.

In Paragraph 1910.108(g)(3) OSHA proposes to change the referenced standard from NFPA 11-1970 to 29 CFR 1910.163.

In Paragraph 1910.108(g)(4) OSHA proposes to change the referenced standard from NFPA 12-1968 to 29 CFR 1910.162.

In Paragraph 1910.108(g)(5) OSHA proposes to change the referenced standard from NFPA 17-1969 to 29 CFR 1910.161.

Section 1910.109—Explosive and blasting agents. In paragraph 1910.109(i)(7)(i) OSHA proposes to change the referenced standard from NFPA 13-1969 to 29 CFR 1910.159.

In Paragraph 1910.109(i)(7)(ii) (a) OSHA proposes to change the referenced standard from NFPA 10-1970 and NFPA 14-1970 to 29 CFR 1910.157 and 29 CFR 1910.158 respectively.

All of the above changes to Subpart H, Hazardous Materials, are made for simplification and clarification of the standards and to eliminate the need for employers and employees to refer to a source apart from other OSHA standards.

(3) SUBPART L—FIRE PROTECTION

Section 1910.156—Definitions. OSHA proposes an expansion to this section to contain not only the present definitions but also the scope and application statements for the subpart. This addition is necessary to make clear that the revised Subpart L applies only to workplaces in general industry and does not apply to the construction and maritime industries which are subject to fire protection requirements in their respective parts.

Further, OSHA proposes definitions for the following terms: Aqueous film-forming foam, approved, automatic fire detection device, combination detector, flame detector, heat detector, line-type detector, other fire detectors, smoke detectors, spot-type detector, carbon dioxide, discharge alarm, dry chemical, dry powder, education, extinguisher classification, extinguisher rating, fixed extinguishing system, foam, gaseous agent, Halon 1211, Halon 1301, inspection, local application system, maintenance, multipurpose dry chemical, pre-action or predischarge alarm, sprinkler alarm, sprinkler system, Class II standpipe system, Class III standpipe system, total flooding system, training, afterflame, basic plane, buddy breathing device, fire brigade, flame resistance, helmet, incipient stage fire, interior structural fire fighting, lining, outer shell, positive pressure breathing apparatus, quick disconnect valve, and vapor barrier. The above definitions would clarify and simplify certain terms in the proposed revision.

Section 1910.157—Portable Fire Extinguishers. As a result of the comments received, OSHA is proposing substantial changes to the existing format of this section. It is noted that this section requires that portable fire extinguishers be installed in all workplaces, unless the workplace comes within the limited exemption provided in paragraph (b) of this section.

The proposed changes reflect our efforts to eliminate those standards which are advisory or which bear little relevance to employee safety.

In order to accommodate the proposed changes to this standard, OSHA has found it necessary to reorganize certain existing paragraphs so that new paragraphs can be placed where they most logically belong. The proposed reorganization of § 1910.157 is as follows:

Paragraph (a), "General requirements," would become paragraph (a), "Scope and application."

Paragraph (b), "Selection of extinguishers," would become paragraph (b), "Exemptions."

Paragraph (c), "Distribution of portable fire extinguishers," would become paragraph (c), "General requirements."

Paragraph (d), "Inspection, maintenance, and hydrostatic testing," would become paragraph (d), "Selection and distribution."

A new paragraph (e) would be added and would be titled "Inspection, maintenance and testing."

A new paragraph (f) would be added and would be titled "Hydrostatic testing."

A new paragraph (g) would be added and would be titled "Training and education."

OSHA proposes a new scope and application paragraph for paragraph (a) of this section. The new paragraph would establish which provisions of the section are applicable to fire extinguishers installed on the inside of workplace buildings and structures and which provisions are applicable to units installed on the outside of workplace buildings and structures. Portable fire extinguishers which are located inside would be subject to the entire section whereas extinguishers for employee use installed outside would only have to meet the maintenance, inspection, and testing requirements of this section. The reason for the limited coverage of the outside extinguishers is that the hazard to employees that is presented by the build-up of toxic gases, smoke, and heat on the inside of workplace buildings and structures is not present in the exterior work environment.

In the new paragraph (b), Exemptions, OSHA proposes to provide an exemption from the requirements of this section for those employers who select the option for total evacuation at the time of a fire emergency. Many comments have suggested that such an optional exemption should be acceptable for those employers who would rather evacuate all employees than permit them to fight fires. To obtain an exemption from this section, the employer would have to develop and implement an effective fire safety

program which would include the total evacuation of all employees from the workplace at the time of a fire emergency. In such cases the provision of portable fire equipment in the workplace would obviously not be for employee use and therefore OSHA would have no need to require or regulate that equipment.

However, in all cases where the employer has provided portable extinguishers in the workplace, OSHA believes that some type of control on the maintenance, inspection, testing and distribution of those extinguishers is necessary to assure employee safety and health. It is in those cases that this section is necessary and relevant to employee safety and health.

In paragraph 1910.157(c)(1) OSHA is proposing to permit the mounting of portable fire extinguishers at any location, provided they are easily accessible to employeees without subjecting the employee to the possibility of injury. To do this, OSHA is combining the wording of several of the present standards into one performance type standard.

In paragraph (c)(2) OSHA is keeping its present requirement that all extinguishers be approved for their expected use. There are no proposed changes to this requirement.

OSHA, in paragraph (c)(3), is proposing for the first time, the prohibition of carbon tetrachloride and chlorobromomethane extinguishing agents. This proposed prohibition is based on the toxicity of these two vaporizing liquids when they are used in extinguishing fires.

Paragraph (c)(4) contains OSHA's present requirement that extinguishers be maintained in fully charged and operable condition and kept in their designated place at all times except during use. There are no proposed changes to this requirement.

In paragraph (c)(5) OSHA is proposing a phaseout of certain extinguishers which operate by inverting the extinguisher to initiate an uncontrolled pressure generating chemical reaction to expel the agent. This type of extinguisher, commonly referred to as the soda-acid type, has been shown to cause severe injury and, in some cases, death to the operators when the extinguisher ruptures during use.

In paragraph (d) OSHA is proposing to permit as much flexibility in extinguisher selection and distribution as possible while assuring employee safety and health. Many of the present standards have been eliminated because they only contain suggestions and because they bear little or no relevance to employee safety.

The most significant change in the selection and distribution portion of the standard is the transfer of the extinguisher distribution tables to the appendix. OSHA proposes to keep the maximum employee travel distances to an extinguisher the same as in the present standard; however, OSHA is deleting distribution requirements based on square feet area because travel distances provide sufficient guidelines for distribution.

Paragraphs (d)(1) and (d)(2) contain the present OSHA standards for Class A extinguisher travel distance and general selection criteria. There have been no proposed changes in these requirements.

OSHA is proposing in paragraph (d)(3) to recognize small hose stations as acceptable substitutes for Class A portable fire extinguishers.

OSHA believes that, for the purpose of employee safety, small hose stations can provide protection equal to or better than that of a Class A unit and for that reason total substitution is acceptable. OSHA believes that those employees who have been designated and trained as fire brigade members can put a small hose station into service and extinguish or control an incipient stage fire as well as they could with Class A portable fire extinguishers. The small additional amount of time that it takes to place a hose system into service is adequately compensated for by the extended range and discharge times associated with the hose system.

Paragraphs (d)(4) and (d)(5) contain the present travel distance requirements for Class B and Class C units. There are no proposed changes to these requirements.

Paragraph (d)(6) contains a proposed new requirement for a 75-foot employee travel distance to Class D extinguishers because previous standards did not address Class D hazards and because Class D fires present a growth rate similar to Class A fires.

OSHA proposes to add a new paragraph (e) to § 1910.157 which would contain the maintenance and inspection requirements. The proposed improvements to the maintenance and inspection paragraph have been made to add certain requirements to further assure that fire extinguishers provided in the workplace for employee use are maintained in a safe condition. By improving and clarifying the maintenance and inspection criteria, OSHA hopes to eliminate the potential of employee injury due to unsafe fire extinguishers.

OSHA is proposing a new paragraph (f) which would contain requirements for hydrostatic testing. This paragraph would contain the updated requirements for hydrostatic testing found in NFPA 10-1977.

OSHA is proposing another new paragraph (g) which would contain the new training and education requirements. The need for these new requirements was identified in the public comments submitted to OSHA.

OSHA is proposing annual training and education of employees who are expected to use portable fire extinguishers as part of their work assignment. Training would include education and "hands-on" training with portable units so that employees would be aware of how an extinguisher acts when it is discharged. Education would include instruction in how extinguishers work and how they should be operated. Education could include either classroom instruction or paycheck envelope notices.

Section 1910.158—Standpipe and hose systems. OSHA is proposing to revise this section to clarify and to update certain provisions based on changes to the source consensus standard.

The proposed changes to this section would contribute to employee safety and health by improving the criteria for the installation and maintenance of standpipe and hose systems installed for employee use.

OSHA has found it necessary to reorganize this section so that the proposed standards follow a logical sequence. The proposed reorganization is as follows:

Paragraph (a), "General requirements," would become paragraph (a), "Scope and application."

Paragraph (b), "Hose outlets" would become paragraph (b), "Protection of standpipes."

Paragraph (c), "Water supplies" would become paragraph (c), "Equipment."

Paragraph (d), "Tests and maintenance" would become paragraph (d), "Water supply."

A new paragraph (e), "Tests and maintenance" would be added.

In the new paragraph (a) OSHA proposes to limit the coverage of the section to those Class II and Class III standpipe systems installed to meet a particular OSHA standard.

OSHA in not addressing Class I standpipe systems because standards related to them were revoked on October 24, 1978.

Paragraph (b) contains the present standard for the protection of standpipes. There have been no proposed changes to this standard.

Paragraph (c)(1) contains the present standards for hose closets and cabinets and there are no proposed changes to the requirement.

Paragraph (c)(2) contains some of the present standards for hose outlets. The remainder of the present standards have either been modified to meet the most recent edition of the source standard or have been deleted because they apply to Class I systems.

Paragraph (c)(3)(i) contains the present requirement for attachment of

fire hose to outlets with the provisions for Class I service removed. There is no change to the intent of the requirement.

OSHA is proposing in paragraph (c)(3)(ii), a requirement for lined hose on hose systems installed after July 1, 1980. The requirement would permit continued use of unlined hose on existing systems until it becomes unserviceable. At that point in time, the unlined hose would have to be replaced with lined hose. OSHA believes this requirement would eliminate the problems associated with poorly maintained unlined hose.

OSHA is proposing in paragraph (c)(3)(iii), to limit the length of fire hose attached to standpipe systems on the basis of friction loss rather than by setting specific lengths for lined and unlined hose. OSHA wants to ensure that the pressure available at the the nozzle will be at least 30 psi (297 kPa). As long as this pressure is available, the length of the hose is not important.

OSHA is proposing in paragraph (c)(4), a requirement that all standpipe nozzles be equipped with shutoff nozzles after June 30, 1981. This type of nozzle permits the nozzle person to have better control over the hose.

Paragraph (d) would contain the present requirements for water supply.

Paragraph (e)(1)(i) would contain the present requirements for the hydrostatic testing of standpipe systems. There are no changes proposed to the present standard.

OSHA is proposing in paragraph (e)(1)(ii), a requirement for a hydrostatic test of fire hose prior to it being placed into service. The test would be conducted with the hose couplings in place to assure that they have been installed correctly. OSHA believes that, through such a requirement, defects such as poor coupling installation, hose manufacture, or leakage can be identified prior to use by the employee.

OSHA is proposing in paragraph (e)(2), requirements for the maintenance of standpipe systems. OSHA believes that a maintenance program will assure that standpipe systems provided in the workplace for employee use will be ready for use in the event of a fire emergency.

Section 1910.159—Sprinkler systems. OSHA is proposing to revise this section to eliminate coverage of some types of sprinkler systems even when they are provided in the workplace and to update the present standard.

To accomplish this, OSHA must reorganize this section so that the standard is presented in a logical sequence. The proposed reorganization of § 1910.159 is as follows:

Paragraph (a), "General requirements," would become paragraph (a) "Scope and application."

Paragraph (b), "Fire department connections," which has been revoked would become paragraph (b), "Exemptions."

Paragraph (c), "Sprinkler alarms," would become paragraph (c), "General requirements."

Paragraphs (d) and (e) would be eliminated.

OSHA is proposing in paragraph (a), a new scope and application paragraph.

OSHA has recognized that some sprinkler systems are installed solely for protection of property and stored materials. Such systems could include those used for in-rack storage protection or warehouse storage protection. Employee exposure to the fire hazard in these cases is usually limited if employees have been instructed to evacuate the workplace immediately upon sprinkler alarm or discharge. Once the employees have evacuated the workplace, the sprinkler systems would be serving a property protection function.

OSHA does not want to encourage the shutting down of sprinkler systems installed only for property protection which do not meet our present criteria. Such a step could be taken by an employer who cannot afford to bring a system into full compliance with the present OSHA standard.

Therefore, OSHA is proposing in paragraph (a)(1) to regulate only those sprinkler systems installed for employee safety.

Sprinkler systems installed for purposes such as extending travel distances to exits would be an example of such a system to be covered by this standard. Sprinkler systems requires by other OSHA standards would also be covered by these proposed standards.

Instead of requiring the employer to continually update the design of his sprinkler systems installed prior to the date of this proposed revision, OSHA would in paragraph (a)(2) recognize compliance with NFPA and NBFU standards for automatic sprinkler systems in effect at the time of installation for all existing automatic sprinkler systems as evidence of complying with the intent of this standard providing employees are not exposed to a recognized hazard.

OSHA is proposing in paragraph (b), an exemption for those systems installed for the sole purpose of providing property protection.

OSHA is proposing as paragraph (c), those general requirements necessary to ensure the reliability of a sprinkler system's design and installation.

Paragraph (c)(1) is a performance type requirement which would state that sprinkler systems be capable of providing adequate protection and that only approved equipment and devices be used to comply with the standard.

Paragraph (c)(2) contains the present requirement for proper maintenance of the system. The paragraph has been rewritten, but does not alter the requirement.

Paragraph (c)(3) would state that employers be able to show that proper acceptance tests have been conducted on OSHA required sprinkler systems. Such tests would assure that systems operate as designed.

OSHA proposes in paragraph (c)(4), a requirement for at least one automatic water supply. This is the same as the present requirement; however, OSHA further proposes to require either an auxiliary water supply or an evacuation plan for protected areas when the primary supply is out of service. OSHA would also limit auxiliary supplies to those systems having more than 20 sprinklers. The new proposed requirements would ensure continued employee protection in cases where primary water supplies are unavailable for some reason.

OSHA proposes in paragraph (c)(5), to permit the attachment, at the end of sprinkler pipes of wet-pipe systems, of small hose for firefighting purposes. The current edition of the National Fire Protection Association's Standard for Automatic Sprinkler Systems, NFPA No. 13-1976, permits such attachments under certain conditions.

OSHA is proposing in paragraph (c)(6), a requirement to protect sprinklers from freezing.

Paragraph (c)(7) contains a requirement which would require the installation of sprinkler systems in a manner which would provide for drainage of water to enhance maintenance.

Paragraph (c)(8) would prohibit torch cutting for modifying or repairing sprinkler systems.

Paragraph (c)(9) would contain requirements for the style and type of sprinklers permitted on certain systems.

Paragraph (c)(10) would contain the present requirement for water flow alarms but would limit the alarm to systems having more than 20 heads.

Paragraph (c)(11) would provide for sprinkler spacing and clearances. OSHA is proposing a vertical clearance of 18" between heads and obstructions below the heads to permit proper distribution of water.

Paragraph (c)(12) would require a means of identification of hydraulically designed sprinkler systems.

Section 1910.160—Fixed extinguishing systems. This section has been rewritten to include design and installation requirements for all fixed extinguishing systems installed to meet OSHA requirements and to provide

clarity and conformity with newer source standards. It is intended to place the general requirements for installation and design of fixed systems into one paragraph rather than repeat them under each specific fixed extinguishing systems section. The specific sections would contain only those requirements which are relevant to employee safety and health and which concern the type of agent used in the system.

This proposed section contains general requirements taken from all of the present sections on specific fixed systems and are rewritten for clarity. There would be no change in the coverage in the present general requirements.

OSHA proposes in paragraph (a), a scope and application statement stating that this section applies to all fixed extinguishing systems installed to meet a particular OSHA standard. Total flooding systems, which pose a potential health or safety hazard to employees, would be covered in all cases regardless of the reason for which they were installed. OSHA does not propose to regulate those systems installed for property protection and where there is no employee exposure.

OSHA is proposing in paragraph (b)(1), a requirement that fixed extinguishing systems and components be designed and approved for the hazard they protect.

OSHA is proposing in paragraph (b)(2) that adequate temporary fire protection be provided when an OSHA required fixed system is inoperative.

OSHA proposes in paragraphs (b)(3) and (b)(4), certain alarms for the discharge of agent and for the prevention of re-entry into areas made hazardous by system discharge.

OSHA proposes in paragraph (b)(5), the labeling or posting of work areas which can become hazardous by the discharge of the fixed system in that area.

OSHA proposes in paragraph (b)(6), an annual inspection for each system to determine if the system is in proper operating condition.

Paragraphs (b)(7), (b)(8), and (b)(9) contain requirements found in the present standards for fixed systems. They have no proposed changes other than being relocated to this section.

Paragraph (b)(10) contains a proposed requirement that employees designated to inspect, maintain, operate or repair fire extinguishing systems be trained and informed in the functions they are to perform.

OSHA proposes in paragraph (b)(11), a ban on the use of carbon tetrachloride and chlorobromomethane as extinguishing agents in systems used to meet OSHA standards for the same reasons as discussed under the fire extinguisher section.

Paragraphs (b)(12) through (b)(19) are proposed to provide reliable system operation and have been adopted from the NFPA standards applicable to fixed extinguishing systems.

OSHA is proposing in paragraph (b)(20) that the means of egress from a discharge area be in accordance with Subpart E of the part.

OSHA also recognizes that there is a special hazard to employees associated with total flooding systems. Therefore, OSHA is proposing in paragraph (c) of this section to regulate those total flooding systems with potential health or safety hazards to employees. The proposed paragraph would set requirements for maximum safe concentrations of agent, emergency action plans and predischarge alarms. All of these provisions are necessary to provide adequate employee protection from possible entrapment in total flooding discharge areas.

OSHA believes that the general requirements proposed above are necessary to ensure adequate employee protection from the hazards associated with unreliable or inadequate fixed fire suppression systems.

Section 1910.161—Fixed extinguishing systems, dry chemical. Section 1910.161, as it is presently written, is proposed to be revoked. The occupational hazards associated with carbon dioxide extinguishing systems which are presently covered by § 1910.161 would be covered by the proposed revisions to § 1910.162 of this subpart.

The proposed revisions to § 1910.161 contain requirements for dry chemical fixed extinguishing systems. Some of the proposed requirements are new and some are the same as those found in § 1910.160 of the present standard.

OSHA is proposing in paragraph (a), a scope and application statement for dry chemical extinguishing systems installed for employee protection.

OSHA is proposing in paragraph (b), specific requirements for dry chemical extinguishing systems. These proposed requirements would supplement the general requirements of proposed § 1910.160, and they would address specific hazards related only to dry chemical systems.

In paragraph (b)(1) OSHA is proposing a requirement that dry chemical agents be approved by an agency acceptable to OSHA, for their intended use. This would ensure that an agent would provide adequate employee safety.

In paragraph (b)(2) OSHA proposes a requirement that would prohibit the mixing together of dry chemicals made of different compositions. Such mixtures can cause a pressure build-up inside of the storage container which could lead to a stressing of the cylinder beyond acceptable limits.

In paragraph (b)(3) OSHA proposes a requirement for predischarge alarms in areas where employee vision could be impaired by system discharge. By providing a predischarge alarm, the employer can evacuate employees before the system discharges and thereby assist employee evacuation.

In paragraph (b)(4) OSHA proposes a requirement for checking dry chemical storage cylinders to ensure that they are free of moisture. Moisture causes dry chemical to cake and thereby reduce the effectiveness of a systems discharge rate.

Section 1910.162—Fixed extinguishing systems, gaseous agent. Section 1910.162 of the present standards is reserved. OSHA proposes to use this section for standards relating specifically to fixed extinguishing systems which use gaseous agents.

New gaseous type agents have become available since the publication of the existing fire protection standards, and they present acceptable substitutes for agents such as carbon dioxide. OSHA is proposing new regulations in this section to cover these agents as well as to use the present requirements, which were found in § 1910.161, to cover carbon dioxide systems. The most recent gaseous agents OSHA would recognize are Halon 1301 and Halon 1211.

OSHA is proposing in paragraph (a), a scope and application statement for fixed extinguishing systems using gaseous type extinguishing agents. Such systems would have to comply with the general requirements of § 1910.160 and the specific requirements of this section.

In paragraph (b) OSHA proposes specific requirements for fixed extinguishing systems using gaseous type agents.

OSHA is proposing in paragraph (b)(1) that the agents used to supply fixed gaseous extinguishing systems be approved for the system's application. Such a requirement assures reliability of the system.

OSHA is proposing in paragraph (b)(2) that inert gaseous type extinguishing agents be maintained at sufficient concentration after discharge to extinguish a fire either by enclosure or by applying extra gas. This requirement would prevent the possibility of a reignition after employees have reentered the workplace.

OSHA is proposing in paragraph (b)(3) that the concentration of agent used to extinguish surface fires be such that the development of toxic decomposition products be kept to a minimum. This requirement would ensure employee protection from inadvertent exposure to toxic levels of extinguishing agents.

OSHA is proposing in paragraph (b)(4) that the concentration of agents

used to extinguish deep-seated fires be capable of being maintained for at least seven minutes after initial discharge. In some cases, longer periods of time may be necessary to allow for the smoldering to be extinguished and the material to cool to a point where reignition is prevented. This requirement would eliminate the possibility of reignition after employees have reentered the workplace.

OSHA is proposing in paragraph (b)(5), a maximum discharge time of 30 seconds to reach the design concentration for total flooding systems because such a time limit would reduce the possibility of an incipient stage fire reaching a higher level of involvement.

OSHA is proposing in paragraph (b)(6), a requirement to maintain effective agent concentations in areas where fire brigade members are providing emergency actions. This requirement would prevent possible entrapment of brigade members due to reignition of the fire.

In paragraphs (b)(7), (b)(8) and (b)(9) OSHA proposes limits for concentrations of acceptable gaseous agents. Employees would not be required to wear personal protective equipment if exposed to agent concentrations less than the proposed levels. OSHA would limit Halon 1301 concentration to 10%, and Halon 1211 or carbon dioxide concentrations to 4% if employees are exposed for a short period of time. In areas where employees would normally remain after discharge of the extinguishing agent, OSHA would limit Halon 1301 concentration to 7% and prohibit the use of Halon 1211 and carbon dioxide.

In paragraph (b)(10) OSHA proposes a performance type standard for the quantity of inert gaseous type extinguishing agent. This would permit flexibility in determining the quantity of gas necessary for employee protection.

Section 1910.163—Fixed extinguishing systems, water spray and foam. The present standards in § 1910.163 apply to local fire alarm signaling systems. OSHA is proposing to change the title of the present section to "Fixed extinguishing systems, water spray and foam" and to transfer coverage of local fire alarm signaling systems to new § 1910.164a of the proposal. The title change is necessary to provide a section for water spray and foam extinguishing systems which would follow the other fixed system requirements. The new requirements proposed in § 1910.163 would cover fixed extinguishing systems using water spray or foam as the extinguishing agent. Automatic sprinkler systems would be covered by § 1910.159 instead of this section.

In paragraph (a)(1) OSHA would propose a scope and application for the section. It would also exempt automatic sprinkler systems from coverage under this section because they are covered under § 1910.159

In paragraph (b) OSHA proposes specific requirements for foam and water spray systems. These specific requirements would supplement the general requirements found in § 1910.160.

Paragraph (b)(1) would state that foams not be used to extinguish fires involving gases, cryogenic liquids or liquefied gases with boiling points below ambient workplace temperatures. Foam agents are ineffective on fires involving these fuels.

Paragraph (b)(2) would state that foams or water spray not be used to extinguish fires in materials which react violently with water.

Paragraph (b)(3) would state that regular foams not be used for polar solvent liquid fires. Regular foam is ineffective on this type of fire, and there are special foams designed and available for this purpose.

Paragraph (b)(4) would state that different types of foam shall not be mixed together. The chemical composition of various types of foam concentrates may be different and therefore incompatible. Such mixing may produce an ineffective agent and reduce the protection of employees.

Paragraph (b)(5) would prohibit the discharging of foams through spray devices onto fires involving water soluble solvents in depths exceeding one inch because discharging the agent in this manner may increase the size of the fire by causing the solvent to froth and overflow its container.

Paragraph (b)(6) would state the systems be designed to prevent a fire from reigniting. This would prevent the possibility of entrapment for fire brigade members performing clean-up or rescue operations.

Paragraph (b)(7) would state that drainage of water spray systems be directed to a location away from employee work areas to prevent employee exposure to flammable liquid or vapor runoff.

1910.164—Fire detection systems. OSHA proposes to use § 1910.164, which is presently reserved for fire brigades, to contain the new requirements applicable to fixed detection systems. Fire brigades would be covered in § 1910.165. OSHA is proposing to regulate those fixed detection systems installed to provide early warning of a workplace fire. These new requirements are not contained in the present standards, because there were no national consensus standards available when the initial standards were published. A national consensus standard, NFPA No. 72E—Automatic Fire Detectors, was published in 1974 and these proposed requirements are based on that standard.

Paragraph (a) contains the scope and application statement for the section.

OSHA proposes in paragraph (b)(1) that all components and devices of fire detection systems be approved by an agency acceptable to OSHA to ensure their reliability.

OSHA proposes in paragraph (b)(2) that all fire detection systems be restored to normal operating condition after each test of the alarm system. This would ensure the reliability of the system and the continued protection of employees.

OSHA proposes in paragraph (d), requirements for protecting fire detectors from physical damage due to impact, corrosion or weather. The paragraph would also require adequate methods for mounting detectors.

In paragraph (e) OSHA proposes requirements for fire detector response time. OSHA is proposing performance-type criteria which would give employers and employees sufficient time to react to fires detected by the system.

In paragraph (f) OSHA proposes to require that the design and the distribution of fixed detection devices be based upon accepted engineering practices. This would ensure that the devices are reliable and adequate to provide protection of employees.

Section 1910.164a—Employee alarm systems. OSHA is proposing § 1910.164a to provide new standards for employee alarm systems which would be used to inform employees of a fire or other hazardous emergency in the workplace. The new standards proposed in this section have been developed using the NFPA standards 72A, Local Protective Signaling Systems, 72B, Auxiliary Signaling Systems, 72C, Remote Station Signaling Systems, and 72D, Proprietary Signaling Systems. The section would provide for an effective alarm signaling system which would give employees sufficient time to safely evacuate.

In paragraph (a) OSHA is proposing a scope and application statement for the section which would give the coverage of the section.

OSHA is proposing in paragraph (b)(1) that an alarm system be installed in the workplace to provide sufficient reaction time to safely evacuate employees at the time of a life threatening emergency in the workplace.

OSHA proposes in paragraph (b)(2) that the alarm be capable of perception above ambient noise or light levels by all employees in the protected area. OSHA would also permit the use of tactile devices for those employees who would be unable to see or hear an alarm.

OSHA proposes in paragraph (b)(3) that the alarm be distinctive and recognizable as an emergency alarm.

OSHA proposes in paragraph (b)(4) that all employees be informed of the preferred method of sounding an emergency alarm.

OSHA is proposing in paragraph (c), requirements for the installation and restoration of alarm systems and components. OSHA would permit the use of steam whistles, air horns, strobe lights or tactile devices which have not been approved if the devices can provide adequate warning to all employees. OSHA recognizes that these types of devices are currently in use and that they can be expected to perform adequately if they are tested and maintained properly.

OSHA proposes in paragraph (d)(1) that all systems be maintained, installed and operated in the condition for which they are designed.

OSHA proposes in paragraph (d)(2) that the alarm system be tested bimonthly (every two months) to ensure its reliability and adequacy and that such testing include the actuation of a different devise during each successive test so that no individual device is used for two consecutive tests.

OSHA proposes in paragraph (d)(3) that power supplies be maintained at all times. OSHA is proposing that a back-up means of notifying employees of an emergency be provided during periods when the alarm system is inoperative.

OSHA proposes in paragraph (d)(4) that every emergency alarm system provided after July 1, 1980, be monitored so that a failure of the system would cause a positive signal to be transmitted to personnel indicating that there is a deficiency in the system.

OSHA proposes in paragraph (e) that all manual alarm stations be unobstructed, approved, conspicuous and readily accessible, and be located within 200 feet of employee workstations.

Section 1910.165—Fire brigades. The section for fire brigades is reserved in § 1910.164 of the present Subpart L standards. However, requirements for fire brigades are now proposed to be included in subpart L as a new § 1910.165. The decision to propose standards for fire brigades is a result of the following factors:

(1) Information collected by OSHA indicates that deaths and injuries of employees have occurred while fighting fires as members of fire brigades and related organizations; and

(2) Comments received support the concept that there should be requirements to ensure that employees who are members of fire brigades be trained and physically capable of performing required duties.

Therefore, OSHA is proposing a standard for fire brigades in § 1910.165. The present §§ 1910.165 and 1910.165a are proposed to be revoked because they only contain NFPA references.

OSHA is proposing in paragraph (a), to set forth the scope and application of this section. The requirements of the section would only apply to those fire brigades organized to protect workplaces and the employees therein; and, to those private or contract type fire departments which fall within the jurisdication of OSHA.

OSHA has no direct jurisdiction over volunteer, local, or State government operated fire departments. Therefore, such departments would not be covered by this section. The proposed section also does not address the hazards of, nor does it apply to, forest fire fighting or airport "crash-rescue" type operations. The proposed requirements contained in § 1910.165 would not be appropriate because of the specialized nature of these types of fire fighting operations.

OSHA is proposing in paragraph (b), requirements for the organization of fire brigades.

In paragraph (v)(1) OSHA is proposing a requirement for the preparation of an organizational statement which would be the written policy of the employer pertaining to fire brigades. The statement would include a description of the function the brigade is to perform.

The organizational statement would be required to be kept at the workplace and available for inspection by employees, the Assistant Secretary of Labor for Occupational Safety and Health or designee. The statement would be intended to be a tool to aid employees in understanding their responsibilities and would help the compliance officer in determining if the level of training is consistent with the functions the brigade would be expected to perform.

In paragraph (b)(2) OSHA is proposing a requirement that brigade members be physically capable of performing the duties assigned to them in a safe manner.

Physical capability can be determined by such methods as preplacement physical examinations, physical agility tests, and periodic physical reexaminations using stress tests. The proposed standard would not require any specific type of examination, nor would it specify any frequency for screening; this would be decided by the medical professional in charge.

It would also specify that employees with known heart disease, epilepsy, or emphysema could not participate in fire brigade emergency activities unless permitted to do so by a certificate issued by a licensed physician.

OSHA is proposing training requirements for fire brigades in paragraph (c). The comments OSHA has received support the concept of the formation of fire brigades and that members should be properly trained to perform the duties they are expected to carry out during brigade activities.

Paragraph (c)(1) would require training to be commensurate with those functions that the fire brigade would perform. The intent of this requirement is to assure that a training program is developed for brigade members while at the same time providing enough flexibility in the requirement so that the training program could be tailored to meet the needs of the fire brigade.

In paragraph (c)(2) OSHA is proposing that training be conducted frequently enough to ensure that assigned duties and functions would be performed satisfactorily and in a safe manner so as not to endanger brigade members or other employees. OSHA also proposes that a training session be conducted for all brigade members at least annually.

OSHA is proposing in paragraph (c)(3) that training include hands-on training where brigade members operate the equipment which they are expected to use, and perform or simulate the operations they are expected to perform during emergency situations.

Regardless of the type of training program developed, it is imperative that brigade members know what to do in emergency situations and how to do it. Just as important, brigade members should know how it feels to operate fire equipment and what to expect from it. During training sessions, brigade members should actually perform those operations which may be assigned to them during emergency situations, such as discharging extinguishers and performing ladder or hose evolutions. Most of the comments OSHA has received concerning training support this concept.

OSHA is proposing in paragraph (c)(4), a requirement that brigade members be informed of special hazards in the workplace that could pose problems during firefighting. Since OSHA is mandated to protect the health and safety of the Nation's workers, OSHA believes this requirement is necessary to ensure that employees will be well informed of special hazards to which they may be exposed as members of a fire brigade.

In the appendix relating to this section, is contained recommended elements which should be incorporated into a fire brigade training program. The recommendations in the appendix should not be considered to contain all the necessary elements for a complete and comprehensive training program;

but they may be helpful as a guide in developing such a program.

OSHA is proposing in paragraph (d), a requirement that fire brigade equipment be maintained and periodically inspected to ensure safe operational condition of the equipment.

OSHA is proposing in paragraph (e), requirements for protective clothing which would apply only to fire brigade members who perform interior structural firefighting. OSHA has received comments suggesting that protective clothing standards be applicable to all types of firefighting. OSHA is aware of the hazards of other types of firefighting, but believes that interior structural firefighting poses a special type of hazardous situation faced by fire brigade members. Therefore, OSHA is limiting these proposed requirements to protective clothing worn during interior structural firefighting.

This proposed paragraph would not preclude giving supervisory personnel the discretion of allowing brigade members to remove certain protective clothing when fire conditions abate to the extent that mop-up or salvage operations are being performed. The intent of the proposed requirements for protective clothing is to ensure protection of brigade members who can expect to be inside of buildings and enclosed structures fighting fires beyond the incipient stage and exposed to extreme temperatures and toxic super-heated products of combustion.

The protective clothing to be covered by these proposed requirements would provide foot and leg protection, body protection, hand protection, and head, eye and face protection.

OSHA is proposing in paragraph (e)(1), three general requirements for protective clothing. The first proposed general requirement would allow a five year phase-in period for protective clothing used to meet this standard. Protective clothing purchased after July 1, 1980 would have to meet the proposed criteria. All protective clothing which would be worn while performing interior structural firefighting would have to meet the proposed criteria by July 1, 1985.

The second proposed general requirement would require that brigade members wear protective clothing while performing interior structural firefighting. OSHA has received comments suggesting that brigade members also wear protective clothing when responding to fire emergencies. OSHA would strongly recommend that such clothing be worn while on fire apparatus, responding to fire emergencies. Since there are many brigade members who respond on foot to a fire or to a predetermined location and then acquire their protective equipment and gear, OSHA is only proposing a requirement that protective clothing be worn during interior structural firefighting.

The final proposed general requirement would specify the elements of the protective clothing ensemble which are necessary to meet the proposed standard.

OSHA is proposing three requirements for foot and leg protection in paragraph (e)(2). The first proposed requirement would identify two alternative methods for satisfying the foot and leg protection requirements of this section. Foot and leg protection can be achieved by: (1) Fully extended boots which protect the legs and meet the requirements of this section; or by, (2) protective shoes or boots and trousers which meet the requirements of this section.

The use of foot and leg protection, as well as fire-resistive coats, should be coordinated to ensure full body protection for the wearer. The proposed requirement recognizes the interdependence of protective clothing to cover one or more parts of the body. Therefore, the option is given so that brigade members can wear long fire-resistive coats in combination with fully extended boots; or, members can wear shorter fireresistive coats in combination with protective trousers and protective shoes or shorter boots.

The second proposed requirement in paragraph (e)(2) for foot and leg protection would require protective footwear to meet § 1910.136 for Class 75 footwear. Section 1910.136 references ANSI Z41.1, (1967) "American National Standard for Men's Safety-Toe Footwear." This second proposed requirement in paragraph (e)(2) would also require protective footwear to be water-resistant for at least five inches above the heel and to be equipped with slip-resistant outer soles.

The final proposed requirement in paragraph (e)(2) specifies penetration-resistance of the sole of protective footwear. OSHA believes that employees performing firefighting operations need protection for the feet when stepping on nails or other sharp objects. It would state that when tested in accordance with "Military Specifications for Fireman's Boots," MIL-B-2885D (1973 and amendment 1975), protective footwear should provide protection against penetration of the midsole by a size 8D common nail when at least 300 pounds of static force is applied to the nail.

OSHA proposes two requirements for body protection in paragraph (e)(3). The first proposed requirement would allow body protection to be achieved by one of the following methods: (1) Wearing of a fire-resistive coat in combination with fully extended boots; or, (2) wearing of a fire-resistive coat in combination with protective trousers. This proposed requirement is intended to coordinate the wearing of fire-resistive coats with foot and leg protection to ensure full body protection.

The second proposed requirement consists of criteria for fire-resistive coats and protective trousers. OSHA proposes to adopt the requirements of the NFPA standard for protective clothing for structural firefighting (NFPA No. 1971-1975) with the following variations in those requirements to provide flexibility in selection without sacrificing employee protection.

(a) The liner may be detachable but the shell would not be permitted to be worn without the liner while performing interior structural firefighting.

(b) The protected ventilation openings would be permitted to increase ventilation of trapped body heat.

(c) The tearing strength of the outer shell would be required to be a minimum of eight pounds.

(d) The criteria for flame-resistance of the outer shell surfaces after the removal of a test flame would be:

Maximum after-flame—2 seconds
Maximum after-glow—4 seconds
Average char-length—6 inches.

(e) The outer shell and lining would be permitted to char or discolor but would have to retain heat resistance and could not separate or melt when placed in a forced air laboratory oven at a temperature of 500°F (260°C.) for a period of five minutes.

The main reason OSHA is proposing to adopt certain requirements of the NFPA No. 1971 (1975) standard is to provide minimum criteria for fire-resistive coats and protective trousers. The NFPA 1971 standard is currently the recognized consensus standard covering the subject matter.

OSHA is proposing requirements for hand protection in paragraph (e)(4). The hand is one of the body parts most frequently injured during firefighting. Even while wearing gloves, fire fighters have sustained injuries to the hands (and wrists) from radiant and conductive thermal energy, as well as from cuts, abrasions, and punctures.

The first two proposed requirements for hand protection would establish performance criteria for protective gloves. The first requirement would state that hand protection consist of protective gloves or glove systems which allow dexterity of hand movement and sense of feel for objects.

The second requirement would state that the exterior material of protective gloves provide resistance against abrasion, puncture, and absorption of liquids.

The third proposed requirement for hand protection would state that gloves be fire-resistant. This proposed requirement would reference Federal

Test Method Standard No. 191-1971, "Textile Test Methods," and would state that the maximum after-flame be 2.0 seconds and the maximum char length be 4 inches.

The fourth proposed requirement in paragraph (e)(4) would state that thermal insulation of gloves be sufficient to prevent the temperature inside the gloves from exceeding 111°F (44°C) when the gloves are exposed to 932°F (500°C) for five seconds at 4 psi (28 kPa) pressure. OSHA proposes that the testing be done in accordance with the NIOSH publication, "The Development of Criteria for Firefighters' Gloves; Vol. II: Glove Criteria and Test Methods" (1976).

The final proposed requirement for hand protection would state that when the design of the fire-resistive coat does not otherwise provide protection for the wrists, protective gloves shall have wristlets of at least 4.0 inches (10.2 cm) in length to protect the wrist area when the arms are extended upward and outward from the body. Wristlets of 4 inches in length would be considered to be the minimum length necessary to protect the wrist area.

OSHA is proposing requirements for head, eye, and face protection in paragraph (e)(5).

The first proposed requirement in paragraph (e)(5) addresses head protection. OSHA proposes to adopt the requirements contained in the National Fire Prevention and Control Administration's (NFPCA) document, "Model Performance Criteria for Structural Firefighters' Helmets," (1977). OSHA believes that the criteria contained in ANSI Z89.1-1969 for Class D helmets are no longer satisfactory for providing proper protection of brigade members while performing interior structural firefighting.

OSHA believes that the NFPCA document contains all of the criteria necessary for proper head protection and that this criteria are the best which has been developed to date.

The NFPCA document is based on research conducted by the Institute for Applied Technology, National Bureau of Standards and it contains performance and testing criteria for: Impact attenuation; penetration resistance; chin strap/retention system; ear flaps; configuration; flame resistance; heat resistance; electrical insulation; and visibility and reflectivity. The ANSI Z89.1 standard does not adequately address these factors.

The last two proposed requirements in paragraph (e)(5) address eye and face protection because employees fighting fires are often exposed to falling and flying materials which could cause eye and face injuries. In order to guard against such injuries, OSHA is proposing that protective eye and face devices complying with § 1910.133 be used by brigade members when performing operations where the hazards of flying or falling materials are present and which may cause eye and face injuries. Many head protective devices include face shields as accessories. Additionally, full-facepieces of breathing apparatus meeting the requirements of § 1910.134 and paragraph (f) of this proposed section would also be acceptable as meeting the proposed requirements for eye and face protection.

OSHA is proposing requirements for respiratory protective devices in paragraph (f).

Paragraph (f)(1) would contain general requirements for all respiratory protection devices used by fire brigade members. Paragraph (f)(2) would contain requirements for positive-pressure breathing apparatus.

In the first general requirement, respiratory protective devices would have to meet the requirements of § 1910.134 and this paragraph. OSHA believes that § 1910.134 provides an effective framework for a resiratory program; however, some additional criteria are needed in order to provide greater protection for fire brigade members because of the severe hazards present in the work environment.

The second proposed general requirement would state that approved self-contained breathing apparatus with full-facepiece should be worn by brigade members while working inside buildings or confined spaces where there is dense smoke, an oxygen deficiency or temperature extremes. The proposed requirement would also state that such apparatus be worn during emergency situations involving toxic substances. OSHA believes it is necessary to require the wearing of self-contained breathing apparatus with a full-facepiece in those instances when fire brigade members are exposed to smoke, elevated temperature extremes, oxygen deficiencies, or toxic substances, because other types of breathing apparatus would not provide adequate protection.

The third proposed general requirement would allow breathing apparatus to be equipped with a "buddy-breathing" device or a quick disconnect type valve or both as long as such accessories do not cause damage to the apparatus, restrict the air flow of the apparatus, or obstruct the normal operation of the apparatus.

The first of these accessories, the buddy-breathing device, is a device where a second person can share the same air supply as that of the wearer of the apparatus. Its use is intended only during emergency escape situations. The device precludes the need to pass the facepiece between two brigade members.

There have been instances reported where a fire-fighter's air supply has been depleted because of being pinned or trapped, or as a result of a malfunction of the apparatus. The availability of a second air supply would assist an endangered firefighter.

A safer and improved procedure to use in such a situation is to have a buddy-breathing device incorporated into the breathing units that would allow for two facepiece hose connections. With this type of device, both facepieces are connected into a common air supply and both firefighters would be benefitted by the available air.

The second accessory, a quick disconnect valve, is a device which starts the flow of air by insertion of the facepiece hose into the regulator of a self-contained breathing apparatus, and stops the flow of air by disconnection of the hose from the regulator. OSHA proposes to permit this type of device because it would assist in the use of positive-pressure type breathing apparatus and would aid in the conservation of the air supply.

The fourth proposed general requirement permits the interchangeability of certified air bottles. OSHA believes the interchangeability of certified air bottles is necessary because the breathing apparatus used by a fire department (providing aid to a fire brigade) and the breathing apparatus of the fire brigade may be made by different manufacturers. There may also be breathing apparatus within the brigade or fire department itself which is made by different manufacturers.

The proposed requirement would state that approved self-contained compressed air breathing apparatus be compatible when used with other approved cylinders of the same size and pressure rating and may be interchanged. The proposed requirement would also state that all compressed air cylinders used with self-contained breathing apparatus shall meet DOT and NIOSH criteria.

The fifth proposed general requirement would state that self-contained breathing apparatus shall have a minimum service life rating of 30 minutes in accordance with the methods and requirements of MSHA and NIOSH. It is generally accepted that breathing apparatus which is rated at 30 minutes, in actuality, lasts only 15-18 minutes, mainly because of the physical activity of firefighters. In light of this, OSHA believes that the 30 minute-rated breathing apparatus provides only the minimum amount of time to be effective in a fire emergency situation. Consequently, self-contained breathing apparatus with a NIOSH minimum service life rating of 30 minutes is specified. Situations which may require longer service life include

entry and escape from cellars, basements, ships, and tunnels.

The sixth proposed general requirement would state that each breathing apparatus be fully recharged and cleaned after each use. Self-contained breathing apparatus would also be required to be stored in such a manner that it would be maintained in a clean and operable condition.

The proposed requirement would not specify any particular method or location for storing the apparatus. Instead, it would only require that the apparatus be stored in a manner that will result in the apparatus being maintained in a clean and operable condition. This would provide some flexibility in the storage method for the self-contained breathing apparatus.

The seventh proposed general requirement concerns an audible alarm which will automatically sound when the remaining service life of the apparatus is reduced to within a range of 20-25 percent of its rated service time. The purpose of this requirment is to provide an early notification mechanism to the wearer that the air supply has been reduced to such a level that escape should be started.

OSHA is proposing in paragraph (f)(2), the following requirements for positive-pressure breathing apparatus.

The first requirement would state that self-contained breathing apparatus purchased after July 1, 1980., be of the pressure-demand or other positive-pressure type when such apparatus is worn by brigade members while performing interior structural firefighting operations. Effective July 1, 1983, this requirement would apply to all self-contained breathing apparatus when used while performing interior structural firefighting. This three year delay would allow for the gradual introduction of positive-pressure type breathing apparatus and would permit an orderly transition to positive pressure respirator.

When a brigade member performs interior structural fire fighting, he is being exposed to unknown concentrations of contaminants. Brigade members do not normally know what contaminants they are encountering, let alone the exact concentrations of the materials which may be present. In light of this uncertainty, brigade members must be provided with the type of respirator which affords the best protection against the unknown environments they may be entering. This is the reason that OSHA believes that positive-pressure breathing apparatus must be used when performing interior structural fire fighting.

The second proposed requirement permits the use of a combination type self-contained breathing apparatus if the apparatus can be switched from a demand to a positive-pressure mode. However, such apparatus would still be required to be in the positive-pressure mode when brigade members are performing interior structural fire fighting.

The allowance of combination-type respirators to meet the requirements of this proposed section would provide some flexibility in the use of the apparatus. For instance, it would be permissible to have apparatus in the demand mode when performing firefighting operations other than those defined as interior structural firefighting. Additionally, it would be permissible to be in the demand mode when responding to the fire location or ascending stairs to the fire floor before actual interior structural firefighting operations begin.

The last proposed requirement would state that, effective July 1, 1985, new positive-pressure breathing apparatus, including full-facepieces, shall be capable of performing to temperatures of −20°F (−40°C). This property is necessary because of the possible conditions that would be encountered during firefighting activities.

At present, NIOSH does not have test criteria for elevated temperatures. However, OSHA believes it is imperative that appropriate test criteria be established to ensure serviceability of the apparatus during interior structural firefighting operations; and, OSHA believes that technology and resources are available such that this proposed requirement could be easily implemented by the July 1, 1985 effective date of this standard.

IV. References

1. "A Study of Facepiece Leakage of Self-Contained Breathing Apparatus by DOP Man Test—Progress Report—July 1, 1971-February 29, 1972"; Los Alamos Scientific Laboratory: Los Alamos, NM.

2. ANSI Z88.5-1973, "Practices for Respiratory Protection for the Fire Service"; American National Standards Institute; New York, NY.

3. "Design Specifications for Respiratory Breathing Devices for Firefighters"; National Institute for Occupational Safety and Health. Cincinnati, Ohio. 1975.

4. "A Report on the Performance of Firefighters' Helmets"; William I. Cook; NIOSH; Morgantown, WV. 1976.

5. ANSI Z90.1; "Specification for Protective Headgear for Vehicular Users;" American National Standards Institute; New York, NY. 1971.

6. ANSI Z41.1; "American National Standard for Men's Safety-Toe Footwear"; American National Standards Institute; New York, NY. 1967.

7. NBSIR 75-702; "Design Criteria for Firefighters' Turnout Coats." Prepared for NFPCA by National Bureau of Standards; Washington, D.C. 1975.

8. Hyatt, Edwin C.; "Respirator Protection Factors;" Los Alamos Scientific Laboratory; Los Alamos, NM. 1976.

9. "The Development of Criteria for Firefighters' Gloves Volume I: Glove Requirements and Volume II: Glove Criteria and Test Methods"; NIOSH; Morgantown, WV. 1976.

10. "Model Performance Criteria for Structural Firefighters' Helmets"; NFPCA; Washington, D.C. August 1977.

11. NPFA-27; "Private Fire Brigades"; National Fire Protection Association; Boston, MA. 1975.

12. NFPA-1971; "Protective Clothing for Structural Fire Fighting"; National Fire Protection Association; Boston, MA. 1975.

13. Federal Register Notice; April 9, 1974 (39 FR 12864).

14. 30 CFR Part 11; "Respiratory Protective Devices; Tests for Permissibility; Fees." 1972.

15. Federal Test Method Standard; "Textile Test Methods." 1968.

16. "A Comprehensive Study of Fire Fighter Injuries and Injury Reporting Systems"; International Association of Fire Fighters; Washington, D.C. October 1977.

17. NFPA-1001; "Initial Fire Attack"; National Fire Protection Association; Boston, MA. 1966.

18. NFPA-4; "Organization For Fire Services"; National Fire Protection Association; Boston, MA. 1971.

19. NFPA-6; "Organization of Industrial Fire Loss Prevention"; National Fire Protection Association; Boston, MA. 1974.

20. NFPA-9; "Training Reports and Records"; National Fire Protection Association; Boston, MA. 1970.

21. ANSI Z89.1; "Safety Requirements of Industrial Head Protection"; American National Standards Institute; New York, NY. 1969.

22. *Washington Star;* "Additional Worries for Fairfax Firemen: Helmets That Melt." Washington, D.C. Oct. 25, 1977.

23. Seymour, Thomas H.; "A Study of Personal Protective Clothing Standards for Fire Fighters"; Fire Protection Engineering Curriculum; University of Maryland. 1972.

24. Military Specification; "Boots, Firemen's;" MIL-B-2885D. May 1973.

25. "How Safe Are Your Turnouts?"; *Firehouse.* October 1977.

26. Federal Register; "Respirator Testing and Approval;" Friday, October 28, 1977.

27. Federal Register; "Safety Standards Revision Procedures Walking-Working Surfaces. Anhydrous Ammonia, Fire Protection, Request for Information; Proposal Withdrawal"; Friday, April 23, 1976.

28. Clougherty, Dr. Edward V.; "Boston's Experience with Protective Clothing"; *Firemen.* October, 1978.

29. Held, Bruce J.; "History of Respiratory Protective Devices in the U.S."; Lawrence Livermore Laboratory. August 1977.

30. Held and Richards; "Research and Development Needs in Firefighters' Breathing Protection"; Lawrence Livermore Laboratory. February 1977.

31. "Fire Safety Aspects of Polymeric Materials: Volume 1—Materials; State of the Art."; A Report by National Materials Advisory Board, National Academy of Sciences. 1977.

32. OSHA Program Directive #300-9; "OSHA Standard Method for Determination of Respiratory Protective Program Acceptability." June 1977.

33. "Proposed Sample Standards for Fire Fighters Protective Clothing and Equipment"; International Association of Fire Fighters; Washington, D.C.

34. "Marshals for Safety"; *Navy Lifeline.* September/October 1977.

35. "Organization and Training of an Industrial Volunteer Fire Brigade"; Vought Corporation Systems Division; Dallas, TX.

36. "Workbook for Initiating the IAFC/IAFF Fire Fighter Apprenticeship Program"; IAFC/IAFF Joint Apprenticeship Program for Fire Fighters; Washington, D.C.

37. "Changes Ahead for Safety Footwear?"; *National Safety News.* July 1975.

38. "Improved Firefighters' Crash-Rescue Boots [Feasibility Study]"; Technical Report No. 120. Navy Clothing and Textile Research Facility; Natick, MA. 1976.

39. "A Preliminary Investigation of the Performance of Men's Safety-Tone Footwear"; Cook and Groce, NIOSH: Morgantown, WV. 1975.

40. "Aluminized Firemen's (Fire Proximity) Handwear: A Comparative Study of Dexterity Characteristics"; Technical Report No. 121. Navy Clothing and Textile Research Facility; Natick, MA. 1976.

41. "Firefighter's Glove Hazard"; *Navy Lifeline.* July/August 1977.

42. *The Safety Journal;* "New Gloves." June/July 1977.

43. *Fire Engineering;* "Injuries Show What Protection Inproved Clothing Should Offer." 1972.

44. "New Hazards for Firefighters"; *Job Safety and Health.* U.S. Department of Labor. February 1975.

45. Utech et al; "The Firefighter's Turnout Coat: A Design Analysis."; *Journal of Safety Research.* March 1974.

46. Krasny and Peacock; "Comments on Flammability Assessment of Apparel Fabrics"; *Textile Chemist and Colorist.* April 1977.

47. "A Report of the State-of-the-Art of Protective Clothing and Equipment for Municipal Firefighters"; National Fire Safety and Research Office, National Fire Prevention and Control Administration. 1977.

48. "Measurement of Thermal Performance of Clothing Used by Firefighters With Some Interpretations"; Geoscience LTD, for United Firefighters of Los Angeles. 1977.

49. "Protective Clothing and Equipment Survey"; International Association of Fire Fighters; Washington, D.C. 1977.

50. "Lightweight Aluminized Fabrics and Insulation-Liner Materials for Proximity Firefighters' Garments"; Technical Report No. 114.; Navy Clothing and Textile Research Unit; Natick, MA. 1975.

51. "Non-Reflective, Wettable, Fibrous, Fabric Assemblies for Firefighters' Clothing"; Technical Report No. 123. Navy Clothing and Textile Research Facility; Natick, MA. 1977.

52. "NBS Develops Helmet Standard"; *Fire Engineering.* July 1976.

53. "What's Ahead in Hard Hats?"; *National Safety News.* April 1975.

54. "Standards Not Adequate for Fire Fighter's Helmet"; *Fire Engineering.*

55. "Development of Criteria for Industrial and Firefighters' Head Protective Devices"; NIOSH; Cincinnati, OH. 1975.

56. "Head Protection: A Top Priority"; *Fire Command.* April 1976.

57. ANSI Z89.2; "Safety Requirements for Industrial Protective Helmets for Electrical Workers, Class B"; American National Standards Institute; New York, NY. 1971.

58. "Report on Tests on Class B Industrial Helmets"; NIOSH.; Morgantown, WV. 1975.

59. McDough, Joseph M.; "Pressure Demand Breathing Apparatus for Firefighters." November 1, 1976.

60. McDonagh, Joseph M.; "Warning, Self-Contained Breathing Apparatus Users." *Maryland Fire and Rescue Bulletin.* 1977.

61. ANSI Z88.2; "Practices for Respiratory Protection"; American National Standards Institute; New York, NY. 1969.

62. ANSI Z86.1; "Commodity Specification Fire Air"; American National Standards Institute; New York, NY. 1973.

63. "Better Testing, Use of Safety Pressure SCBA's May Save Lives"; *Occupational Health and Safety.* September/October 1977.

64. "Breathing Apparatus Regulations Challenged"; *Fire Command.* January 1977.

65. Utech, H. P.; "Eating Smoke—the Dispensable Diet"; *The Fire Independent.* 1975.

66. Utech, H. P.; "Facing Up to Leakage"; *The Fire Independent.* 1975.

67. Utech, H. P.; "Overcoming Facepiece Leakage"; *The Fire Independent.* 1975.

68. Radford and Levine; "Occupational Exposure to Carbon Monoxide in Baltimore Firefighters"; Johns Hopkins University; Baltimore, Maryland; *Journal of Occupational Medicine.* September 1976.

69. Peabody, Homer D.; "Pulmonary Function and the Fire Fighter"; *The Journal of Combustion Toxicology.* February 1977.

70. Sidor and Peters; "Fire Fighting and Pulmonary Function"; *American Review of Respiratory Disease.* Vol. 109, 1974.

71. "Firefighters' Breathing System Study"; Federal Systems Division, International Business Machines Corporation. 1972.

72. "A Guide to Industrial Respiratory Protection"; NIOSH; Cincinnati, OH. 1976.

73. "Master Blueprint for Hand and Body Protection"; *Occupational Hazards.* Vol. 35; March 1973.

74. "Good Health Through Physical Fitness"; Los Angeles City Fire Department. 1971.

75. Dotson, et. al.; University of Maryland, "Development of a Job Related Physical Performance Examination for Firefighters"; A Summary Report to the National Fire Prevention and Control Administration. March 1977.

76. California Proposed Occupational Safety and Health Standards; "Personal Protective Clothing and Equipment for Firefighters." 1977.

77. "Firemen's Safety Standards Backed"; *Los Angeles Times.* August 19, 1977.

78. Barnard and Duncan; "Heart Rate and ECG Responses of Fire Fighters"; *Journal of Occupational Medicine.* April 1975.

79. Barnard, et al; "Near-Maximal ECG Stress Testing, and Coronary Artery Disease Risk Factor Analysis in Los Angles City Fire Fighters"; *Journal of Occupational Medicine.* November 1975.

80. Barnard, et al; "Ischemic Heart Disease in Fire Fighters with Normal Coronary Arteries"; *Journal of Occupational Medicine.* December 1976.

81. "Fire Techonology Broadened in Three Areas"; *National Safety News.* June 1975.

82. 29 CFR Part 1910; "General Industry Standards"; Occupational Safety and Health Administration. 1972.

83. Washington State; "Proposed Safety Standards for Fire Fighters." August 1977.

84. Batzer, M. M.; "Increased On-The-Job Fire Training"; *National Safety Congress.* 1961.

85. "Fire Protective Clothing for the Navy"; *Firemen.* January 1969.

86. "Fire Brigades"; National Safety Council. 1966.

87. Crapnell, Stephen G.; "Chevrolet's One-Two Punch: Crack Fire Brigade and Comprehensive Fire Protection Engineering"; *Occupational Hazards.* November 1977.

88. Davis, Paul O.; "Physical Fitness and the Firefighter"; *Fire Command.* April 1974.

89. Davis, Paul O. and D. L. Santa Maria; "Testing Physical Fitness"; *Fire Command.* 1975.

90. "Project Monoxide—A Medical Study of an Occupational Hazard of Fire Fighters"; International Association of Fire Fighters; Washington, D.C.

91. Sammons and Coleman; "Firefighter's Occupational Exposure to Carbon Monoxide"; *Journal of Occupational Medicine.* Volume 16, No. 8, 1974.

92. American National Standards Institute; "Acceptable Concentrations of Carbon Tetrachloride"; ANSI; New York, NY 10018. 1967.

93. Bukowski, R.; Custer, R.; and Bright, R.; "Fire Alarm and Communication Systems, NBS Tech Note 964"; National Bureau of Standards; Washington, D.C. April 1978.

94. Custer, Richard; "Detector Actuated Automatic Sprinkler Systems—A Preliminary Evaluation, NBS Tech Note 836"; National Bureau of Standards; Washington, D.C. July 1974.

95. Custer, Richard and Wahle, Klaus; "Distribution of Water Through a Vertical Plane From Automatic Sprinkler Heads, NBSIR 75-920"; National Bureau of Standards; Washington, D.C. December 1975.

96. Federal Fire Council; "Portable Fire Extinguisher Studies"; Federal Fire Council; Washington, D.C. October 1965.

97. Federal Fire Council; "Case Histories of Deaths and Injuries from Carbon Tetrachloride Fire Extinguishers"; Federal Fire Council; Washington, D.C. April 1967.

98. Federal Fire Council; "Hazard of Carbon Tetrachloride Fire Extinguishers—Recommended Practices Number 3"; Federal Fire Council; Washington, D.C. January 1967.

99. Ford, Charles; "An Overview of Halon 1301 Systems"; American Chemical Society. 1975.

100. Industrial Commission of Ohio, Division of Safety and Hygiene; "Abolish Carbon Tet Fire Extinguishers"; *Monitor;* October 1970; pp 4-5; Industrial Commission of Ohio.

101. Keating, J. P. and Loftus, E. F.; "Vocal Emergency Alarms in Hospitals and Nursing Facilities: Practice and Potential NBS-GCR-77-102"; National Bureau of Standards; Washington, D.C. July 1977.

102. "L. A. Crash Truck with AFFF Halts Chemical Storage Fire"; *Fire Engineering;* October 1972, pp 40-41.

103. Manufacturing Chemists' Association; "Chemical Safety Data Sheet SD-3, Carbon Tetrachloride"; Manufacturing Chemists' Association, Inc.; Washington, D.C. 1963.

104. Maxfield, Mary; "Toxicity of Bromotrifluoromethane, Haskell Laboratory Report No. 577-74, Medical Research Project No. 1803-1"; Haskell Laboratory for Toxicology and Industrial Medicine; E. I. duPont deNemours and Co.; Wilmington, Del. August 1974.

105. National Association of Fire Equipment Distributors; "Fire Extinguishers Can

Be Dangerous If . . ."; NAFED; Chicago, IL.; 60601. 1976.

106. "NAFED'S Extinguisher-Use Study Results Stress High Protection Effectiveness at OSHA Hearings"; *Firewatch;* Vol. 13, No. 3; 1976; National Association of Fire Equipment Distributors; Chicago, IL.

107. National Association of Fire Equipment Distributors; "Discontinued Fire Extinguishers, How Unsafe? How Ineffective"; NAFED; Chicago, IL. 1974.

108. National Fire Protection Association; *Fire Protection Handbook;* 13th and 14th Editions; National Fire Protection Association; Boston, MA 02201.

109. National Fire Protection Association; *National Fire Codes,* Vols. 1 and 2; National Fire Protection Association; Boston, MA 02201. 1974, 1975, 1976, 1977, and 1978.

110. National Institute for Occupational Safety and Health; "Criteria for a Recommended Standard . . . Occupational Exposure to Phosgene"; U.S. Department of Health, Education and Welfare; Washington, D.C. 1976.

111. National Institute for Occupational Safety and Health "Criteria Recommended Standard . . . Occupational Exposure to Carbon Tetrachloride"; U.S. Department of Health, Education and Welfare; Washington, D.C. 1975.

112. National Institute for Occupational Safety and Health; "Criteria for a Recommended Standard . . . Occupational Exposure to Carbon Dioxide; U.S. Department of Health, Education and Welfare; Washington, D.C. 1976.

113. National Research Council; "An Appraisal of Halogenated Fire Extinguishing Agents"; Proceedings of a Symposium held April 11-12, 1972; National Academy of Sciences; Washington, D.C. 1972.

114. National Safety Council; *Accident Prevention Manual for Industrial Operations;* 7th Edition; National Safety Council; Chicago, IL. 1974.

115. Stahl, Fred I. and Archea, John; "An Assessment of the Technical Literature of Emergency Egress from Buildings, NBSIR 77-1313"; National Bureau of Standards, Washington, D.C. October 1977.

116. U.S. Air Force; "Extinguishment of Alkali Metal Fires"; Technical Documentary Report No. APL TDR 64114, October 1974; Air Force Aero Propulsion Laboratories, Wright-Patterson Air Force Base, OH.

V. Regulatory Assessment Statement

In accordance with Executive Order No. 12044 (43 FR 12661, March 24, 1978), OSHA has assessed the potential economic impact of this proposal. Based on the economic identification criteria proposed by the Department of Labor (43 FR 22915, May 26, 1978), OSHA has concluded that the subject matter of this proposal is not a "major" action which would necessitate further economic impact evaluation and the preparation of a Regulatory Analysis.

JRB Associates, Inc., has prepared for OSHA an economic assessment entitled "Economic Impact Assessment of 29 CFR Part 1910 Subpart L—Fire Protection." The study includes assessment of the technological feasibility of compliance as well as an estimate of compliance costs. The effects on other variables, such as employment, productivity, and market structure, are considered.

According to the study, compliance costs are not expected to exceed $20 million for any of the years 1979 to 1983. In 1984, compliance costs are expected to peak at $21 million, but after 1984, these costs will decline considerably. The study concludes that at present time, compliance with the proposed standard is both economically and technically feasible. Additionally, the proposed modifications to Subpart L are not expected to have any other economic impact that might be considered major. Due to training requirements, the proposed standard could possibly result in a marginal increase in employment. This effect will not be significant when distributed across the entire economy. No significant market structure effects are projected due to regulatory restraints proposed on certain products. The study therefore concludes that, based on data available at the time of analysis, the proposed changes will not have a major economic impact as defined by Executive Order 12044 and criteria proposed by the Department of Labor pursuant to this order.

The economic impact assessment has identified several benefits that will be realized as a result of promulgation of the proposed changes to Subpart L. Some changes are intended to reduce accidents; others give the employer added flexibility. For example, the proposed regulation will prohibit the use of carbon tetrachloride and chlorobromomethane fire extinguishers in OSHA regulated workplaces. This will prevent injuries related to the discharge of toxic substances from fire extinguishers. The proposed regulation also requires the replacement of Soda-Acid and inverting foam extinguishers from OSHA regulated workplaces. Thus, the tendency of these extinguishers to rupture in testing or while in use will be prevented from causing injuries in OSHA regulated workplaces. The initial replacement cost of these extinguishers will be offset by long-run savings in reduced maintenance costs of the new extinguishers and scrap value of the old ones.

The proposed regulation provides for training and equipment for worker protection for those employees who are assigned as fire brigade members to fight interior structural fires. This is expected to reduce the number of injuries to employees involved in firefighting.

The proposed regulation includes several relaxations that provide added flexibility and possible additional cost savings. These include: The exemption from portable fire extinguisher requirements for some employers; and exemptions for sprinkler systems, other fixed systems, employee alarm systems and fire detection systems not installed to meet other OSHA regulations.

Although it is not possible to compare the estimated cost of compliance to quantifiable dollar benefits, it is possible to compare the estimated cost of compliance to the cost of fire losses in OSHA regulated workplaces. The National Association of Fire Equipment Distributors (NAFED) estimates 87 percent of fire incidents that workers extinguish are not reported to public fire departments. For the fires that are reported, the National Fire Protection Association (NFPA) estimates U.S. structure fires and property loss by property use. Using NFPA statistics for 1977, it is derived that $2.242 billion in property losses were incurred by OSHA regulated workplaces. Estimated compliance costs for the proposed regulations are less than one percent of the 1977 estimated property loss as a result of structure fires. In addition to reducing injuries associated with firefighting, the proposed regulation will also have a positive effect in the control of fires by increasing the reliability of fire extinguishers and providing for fire brigades that are better equipped and trained. If a one percent improvement in total fire losses can be realized, the estimated cost of the proposed regulation is completely offset.

OSHA certifies that this proposal is not "major" under E.O. 12044 and the proposed Secretary's guidelines (43 FR 22915).

The assessment is available for inspection and copying at the OSHA Technical Data Center, Room S6212, Third Street and Constitution Avenue, NW., Washington, D.C. 20210. OSHA invites comments concerning the conclusions reached in the economic impact assessment.

VI. Public Participation

Interested persons are invited to submit written data, views and arguments with respect to this proposal. These comments must be postmarked on or before March 2, 1979, and submitted in quadruplicate to the Docket Officer, Docket S-004, Room S6212, U.S. Department of Labor, Washington, D.C. 20210. Written submissions must clearly identify the specific provisions of the proposal which are addressed and the position taken with respect to each issue.

The data, views and arguments that are submitted will be available for public inspection and copying at the above address. All timely submissions received will be made a part of the record of this proceeding.

Additionally, interested persons may file objections to the proposal and re-

quest an informal hearing with thereto. The objections and hearing requests should be filed in accordance with the following contitions:

1. The objections must include the name and address of the objector;

2. The objections must be postmarked on or before March 16, 1979;

3. The objections must specify with particularity the provisions of the proposed rule to which objection is taken and must state the grounds therefor;

4. Each objection must be separately stated and numbered; and

5. The objections must be accompanied by a detailed summary of the evidence proposed to be adduced at the requested hearing.

VI. AUTHORITY

This document was prepared under the direction of Eula Bingham, Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, Third Street and Constitution Avenue, N.W., Washington, D.C. 20210.

Accordingly, under sections 4(b)(2), 6(b), and 8(c) of the occupational Safety and Health Act of 1970 (84 Stat. 1592, 1593, 1599; 29 U.S.C. 653, 655, 657), Secretary of Labor's Order No. 8-76 (41 FR 25059), and 29 CFR Part 1911, it is proposed to amend §§ 1910.35 1910.37, 1910.107, 1910.108, 1910.109 of Title 29, Code of Federal Regulations; to add a new § 1910.38 and to revise Subpart L.

Signed at Washington, D.C. this 15th day of December 1978.

EULA BINGHAM,
Assistant Secretary of Labor.

Part 1910 of Title 29 of the Code of Federal Regulations is proposed to be amended as follows:

1. Section 1910.35 would be amended by adding two new paragraphs to read as follows:

§ 1910.35 Definitions.

* * * * *

(i) "Emergency action plan" means a plan for a workplace describing what the employee life safety hazards are and what actions the employer and employees must take in a life or injury threatening emergency. These actions may include employee escape, firefighting, notifying other employees or firefighting personnel of the emergency, or performing rescue or medical first aid duties.

(j) "Emergency escape" means the route through and from the workplace that employees would follow in the event they are required to evacuate the workplace or seek a designated refuge area. It may include the normal means of egress from the workplace as well as an unsupervised emergency exit or an external wall opening such as a window.

* * * * *

2. Paragraph (n) of § 1910.37 would be amended to read as follows:

§ 1910.37 Means of egress, general.

* * * * *

(n) *Fire alarm signaling systems.* Employers shall assure that fire alarm signaling systems be maintained and tested in accordance with the requirements of § 1910.164a.

* * * * *

3. The heading for the existing § 1910.38 would be deleted and a new § 1910.38 would be added to read as follows:

§ 1910.38 Employee emergency plans.

(a) *Emergency action plan.*—(1) *Scope and application.* This paragraph applies to all emergency action plans required by a particular OSHA standard. The emergency action plan shall consist of and address all designated actions employees must take to ensure employee safety from fire and other emergencies.

(2) *Elements.* The following elements must be addressed in the plan:

(i) Emergency escape procedures and assignemnts;

(ii) Procedures to be taken by employees who remain to operate critical plant operations when the emergency alarm is first given to them before they evacuate;

(iii) Actions to account for all employees after emergency evacuation has been completed;

(iv) Rescue and medical first aid duties and those who are to perform them;

(v) The preferred means of reporting fires or emergencies and an acceptable back-up method or methods of notification;

(vi) The emergency duties of all employees when the alarm is given; and

(vii) Names of persons who can be contacted for further information or explanation of duties under the plan.

(3) *Alarm system.* The employer shall establish an employee alarm system which will comply with 29 CFR 1910.164a.

(4) *Evacuation.* The employer shall designate in the emergency action plan whether immediate and total evacuation or delayed and partial evacuation is planned.

(5) *Training.* (i) The employer shall designate and train a sufficient number of persons to assist in the safe and orderly emergency evacuation of employees.

(ii) The employer shall review the initial plan with all employees having responsibilities under the plan and shall repeat the review whenever the plan is changed.

(iii) The employer shall give a copy of the plan to each employee upon initial employment and shall post it in the workplace for review. For those employers with 10 or fewer employees the plan may be conveyed orally to employees in lieu of posting.

(iv) The employer shall review the plan with an employee when that employee's job duties change to the extent that new emergency duties result.

(b) *Fire prevention plan.*—(1) *Scope and application.* This paragraph applies to all fire prevention plans required by a particular OSHA standard.

(2) *Elements.* The following elements shall be contained in the fire prevention plan:

(i) A list of the major workplace potential fire hazards, potential ignition sources and the type of fire protection equipment or systems which can control a fire involving them.

(ii) The preferred method of contacting the plant fire brigade or the public fire department with an acceptable back-up method or list of methods of notification.

(iii) Designated personnel responsible for maintenance of equipment and systems installed to prevent ignitions or fires.

(iv) Designated personnel for control of fuel source hazards.

(3) *Housekeeping.* The employer shall keep workplaces free of accumulations of flammable and combustible waste materials and residues which can contribute to a fire emergency.

(4) *Training.* (i) The employer shall train employees involved in the fire prevention plan in the recognition of potential fire hazard situations and the methods to correct them. Employees shall be apprised of the fire hazards of the materials and processes to which they are exposed.

(ii) The employer shall review the plan with all employees playing a role in it implementation.

(iii) The employer shall give a copy of the plan to each employee upon initial employment and shall maintain copies of the plan and shall post it in the workplace for review. For those employers with 10 or fewer employees the plan may be conveyed orally.

(5) *Maintenance.* The employer shall regularly and properly maintain equipment and systems installed to prevent ignitions or fires according to established procedures.

* * * * *

4. Paragraph (f)(1) of § 1910.107 would be amended to read as follows:

§ 1910.107 Spray finshing using flammable and combustible materials.

* * * * *

(f) *Protection.*—(1) *Conformance.* In sprinklered buildings, the automatic sprinkler system in rooms containing spray finishing operations shall conform to the requirements of 29 CFR 1910.159. In unsprinklered buildings where sprinklers are installed only to protect spraying areas, the installation shall conform with such standards insofar as they may be applicable. Sprinkler heads shall be located to effect water distribution throughout the entire booth.

* * * * *

5. Paragraph (g) of § 1910.108 would be amended to read as follows:

§ 1910.108 Dip tanks containing flammable or combustible liquids.

* * * * *

(g) *Extinguishment.*—(1) *Extinguishers.* Areas in the vicinity of dip tanks shall be provided with manual fire extinguishers suitable for flammable and combustible liquid fires, conforming to 29 CFR 1910.157.

(2) *Automatic water spray extinguishing systems.* Such systems shall conform to 29 CFR 1910.163 and shall be arranged to protect tanks, drainboards, and stock over drainboards.

(3) *Automatic foam extinguishing systems.* Automatic foam extinguishing systems shall conform to 29 CFR 1910.163 and; * * *

(4) *Automatic carbon dioxide systems.* Automatic carbon dioxide systems shall conform to 29 CFR 1910.162 and shall be arranged to protect both dip tanks and drainboards and unless stock over drainboards is otherwise protected with automatic extinguishing facilities, shall also be arranged to protect such stock.

(5) *Dry chemical extinguishing systems.* Dry chemical extinguishing systems shall conform to 29 CFR 1910.161 and shall be arranged to protect both dip tanks and drainboards, and unless stock over drainboards is otherwise protected with automatic extinguishing facilities, shall also be arranged to protect such stock.

* * * * *

6. Paragraph (i)(7) of § 1910.109 would be amended to read as follows:

§ 1910.109 Explosives and blasting Agents.

* * * * *

(i) *Storage of ammonium nitrate.* * * *

(7) *Fire protection.* (i) Not more than 2,500 tons of bagged ammonium nitrate shall be stored in a building or structure not equipped with an automatic sprinkler system. Sprinkler systems shall be of the approved type and installed in accordance with 29 CFR 1910.159.

(ii)(*a*) Suitable fire control devices such as small hose or portable fire extinguishers shall be provided throughout the warehouse and in the loading and unloading areas. Suitable fire control devices shall comply with the requirements of §§ 1910.157 and 1910.158.

* * * * *

7. Section 1910.156 would be revised to read as follows:

§ 1910.156 Scope, application and definitions applicable to this subpart.

(a) *Scope.* This subpart covers all portable and fixed fire suppression equipment installed to meet the fire protection requirements of 29 CFR Part 1910.

(b) *Application.* This subpart applies to all industries except the maritime industry, construction, and agriculture industries which are covered by separate OSHA standards.

(c) *Defintions applicable to this subpart.* (1) "After-flame" means the time a test specimen continues to flame after the flame source has been removed.

(2) "Aqueous film forming foam (AFFF)" means a fluorinated surfactant with a foam stabilizer which is diluted with water to act as a barrier to exclude air and to develop an aqueous film on the fuel surface which is capable of suppressing the generation of fuel vapors.

(3) "Approved" means acceptable to the Assistant Secretary of Labor for Occupational Safety and Health under the following criteria:

(i) If it is accepted, or certified, or listed, or labeled or otherwise determined to be safe by a nationally recognized testing laboratory, such as, but not limited to, Underwriters' Laboratories, Inc. and Factory Mutual Engineering Corporation; or

(ii) With respect to an installation or equipment of a kind which no nationally recognized testing laboratory accepts, certifies, lists, labels, or determines to be safe, if it is inspected or tested by another Federal agency and found in compliance with the provisions of the applicable National Fire Protection Association Fire Code; or

(iii) With respect to custom-made equipment or related installations which are designed, fabricated for, and intended for use by its manufacturer on the basis of test data which the employer keeps and makes available for inspection to the Assistant Secretary and his authorized representative.

(iv) For the purposes of paragraph (c) (3) of this section:

(*a*) Equipment is listed if it is of a kind mentioned in a list which is published by a nationally recognized testing laboratory which makes periodic inspection of the production of such equipment and which states such equipment meets national recognized standards or has been tested and found safe for use in a specified manner;

(*b*) Equipment is labeled if there is attached to it a label, symbol, or other identifying mark of a nationally recognized testing laboratory which makes periodic inspections of the production of such equipment, and whose labeling indicates compliance with nationally recognized standards or tests to determine safe use in a specified manner;

(*c*) Equipment is accepted if it has been inspected and found by a nationally recognized testing laboratory to conform to specified plans or to procedures of applicable codes;

(*d*) Equipment is certified if it has been tested and found by a nationally recognized testing laboratory to meet nationally recognized standards or to be safe for use in a specified manner, or is of a kind whose production is periodically inspected by a nationally recognized testing laboratory, and if it bears a label, tag, or other record of certification.

(4) "Assistant Secretary" means the Assistant Secretary for Occupational Safety and Health or designee.

(5) "Automatic fire detection device" means a device designed to automatically detect the presence of fire by heat, flame, light, smoke or other products and effects.

(i) "Combination detector" means an automatic fire detection device which responds to more than one product of combustion.

(ii) "Flame detector" means an automatic fire detection device which detects the infrared or ultraviolet, or visible effects produced by a fire.

(iii) "Heat detector" means an automatic fire detection device which detects abnormally high temperature and/or rate-of-temperature rise.

(iv) "Line-type detector" means an automatic fire detection device in which detection is continuous along a path.

(v) "Other fire detectors" means automatic fire detection devices which detect phenomenon other than heat, smoke, light or flame produced by a fire.

(vi) "Smoke detector" means a device which detects visible or invisible particles of combustion.

(vii) "Spot-type detector" means a device whose detecting element is directed at a particular location.

(6) "Buddy breathing device" means an accessory to self-contained breath-

ing apparatus which permits a second person to share the same air supply as that of the wearer of the apparatus. Such devices are used for emergency escape situations.

(7) "Carbon dioxide" means a colorless, odorless, electrically nonconductive inert gas (chemical formula CO_2) that is a medium for extinguishing fires by reducing the concentration of oxygen or fuel vapor in the air to the point where combustion is impossible.

(8) "Class A fire" means a fire involving ordinary combustible materials such as paper, wood, cloth, rubber, and many plastics.

(9) "Class B fire" means a fire involving flammable or combustible liquids, flammable gases, greases, and similar materials.

(10) "Class C fire" means a fire involving energized electrical equipment where safety to the employee requires the use of electrically nonconductive extinguishing media.

(11) "Class D fire" means a fire involving certain combustible metals such as magnesium, titanium, zirconium, sodium, lithium and potassium.

(12) "Discharge alarm" means an alarm which sounds when an extinguishing agent is being discharged through a system.

(13) "Dry chemical" means a compound composed of very small particles of sodium bicarbonate, potassium bicarbonate, urea-based potassium bicarbonate, potassium chloride, or monoammonium phosphate supplemented by special treatment to provide resistance to packing and moisture absorption (caking) as well as to provide proper flow capabilities. Dry chemical does not include dry powders.

(14) "Dry powder" means a compound used to extinguish or control Class D fires.

(15) "Education" means the process of imparting knowledge or skill through systematic instruction. It does not require formal classroom instruction.

(16) "Enclosed structure" means a structure with a roof or ceiling which may present similar fire hazards to employees as buildings.

(17) "Extinguisher classification" means the letter classification given an extinguisher to designate the class or classes of fire on which an extinguisher will be effective for control or extinguishment of a fire. For example, a Class A extinguisher would be effective on Class A fires and a Class B:C extinguisher would be effective on Class B and Class C fires.

(18) "Extinguisher rating" means the numerical rating given to an extinguisher which indicates the extinguishing potential of the unit based on standardized tests developed by Underwriters' Laboratories, Inc.

(19) "Fire brigade" (private fire department and industrial fire department) means an organized group of employees who are knowledgeable, trained, and skilled in firefighting operations.

(20) "Fixed extinguishing system" means a permanently installed system that either extinguishes or controls a fire at the location of the system.

(21) "Flame resistance" is the property of materials, or combinations of component materials, to retard ignition and restrict the spread of flame.

(22) "Foam" means a stable aggregation of small bubbles which flow freely over a burning liquid surface and form a rigid air-excluding blanket which seals combustible vapors and thereby extinguishes the fire.

(23) "Gaseous agent" is a fire extinguishing agent which has a very low density and viscosity, can expand or contract with changes in pressure and temperature, and has the ability to diffuse readily and to distribute itself uniformly throughout an enclosure.

(24) "Halon 1211" means a colorless, faintly sweetsmelling electrically nonconductive liquefied gas (chemical formula $CBrClF_2$) which is a medium for extinguishing fires by inhibiting the chemical chain reaction of fuel and oxygen. It is also known as bromochlorodifluoromethane.

(25) "Halon 1301" means a colorless, odorless, electrically nonconductive gas (chemical formula $CBrF_3$) which is a medium for extinguishing fires by inhibiting the chemical chain reaction of fuel and oxygen. It is also known as bromotrifluoromethane.

(26) "Helmet" is a head protective device consisting of a rigid shell, energy absorption system, and chin strap intended to be worn to provide protection for the head or portions thereof, against impact, flying or falling objects, electric shock, penetration, heat and flame, or any combination thereof.

(27) "Incipient stage fire" means a fire which is in the initial or beginning stage and which can be controlled or extinguished by portable fire extinguishers or Class II standpipe systems without the need for protective clothing or breathing apparatus.

(28) "Inspection" means a visual check of fire protection systems and equipment to insure that they are in place, charged, and ready for use in the event of a fire.

(29) "Interior structural fire fighting" means the physical activity of fire suppression, rescue or both, inside of buildings or enclosed structures which are involved in a fire situation beyond the incipient stage.

(30) "Lining" means a material permanently attached to the inside of the outer shell for the purpose of thermal protection and padding.

(31) "Local application system" means a fixed suppression system which has a supply of extinguishing agent normally connected to fixed piping with nozzles arranged to automatically discharge extinguishing agent directly on the burning material to extinguish or control a fire.

(32) "Maintenance" means the services to be performed on fire protection equipment and systems to insure that they will perform as expected in the event of a fire. Maintenance differs from inspection in that maintenance requires the checking of internal fittings, devices and agent supplies. It requires, at least in part, the physical breakdown, disassembly and reassembly of the unit.

(33) "Multipurpose dry chemical" means a dry chemical which is approved for use on Class A, Class B and Class C fires.

(34) "Outer shell" is the exterior layer of material on the fire coat and protective trousers which forms the outermost barrier between the fire fighter and the environment. It is attached to the vapor barrier and liner and is constructed with a storm flap, suitable closures, and pockets.

(35) "Pipe schedule design" means a sprinkler system design which uses pipe specifications in a relationship between pipe size and the number of sprinklers permitted for each size by workplace classification.

(36) "Positive pressure breathing apparatus" means self-contained breathing apparatus in which the pressure inside the full facepiece is positive in relation to the immediate environment during inhalation and exhalation.

(37) "Pre-action alarm" or "Pre-discharge alarm" means an alarm which will sound at a set time prior to actual discharge of the system so that employees may evacuate the discharge area prior to system discharge.

(38) "Quick disconnect valve" means a device which starts the flow of air by insertion of the hose (which leads from the facepiece) into the regulator of self-contained breathing apparatus, and stops the flow of air by disconnection of the hose from the regulator.

(39) "Sprinkler alarm" means an approved device installed so that any waterflow from a sprinkler system equal to or greater than that from a single automatic sprinkler will result in an audible alarm signal on the premises.

(40) "Sprinkler systems" means a system of piping designed in accordance with fire protection engineering standards and installed to control or extinguish fires. The system includes an adequate and reliable water supply, and a network of specially sized piping and sprinklers which are interconnected. The system also includes a control valve and a device for actuating an alarm when the system is in operation.

(41) "Standpipe systems"—class of service.

(i) "Class II standpipe system" means a small hose system (1-½" or 3.81 cm) which provides a means for the control or extinguishment of incipient stage fires.

(ii) "Class II standpipe system" means a combined system of hose which is for the use of employees trained in the use of hose operations and which is capable of furnishing effective water discharge during the more advanced stages of fire in the inside of workplaces. Hose outlets are available for both large and small hose (1-½", 3.8 cm, and 2-½", 6.3 cm).

(42) "Total flooding system" means a fixed suppression system which is arranged to automatically discharge a predetermined concentration of agent into an enclosed space for the purpose of fire extinguishment or control.

(43) "Training" means the process of making proficient through instruction and practice. Training includes hands-on training of industrial fire brigades or emergency action teams in the duties they are expected to perform.

(44) "Vapor barrier" means that material used to prevent or substantially inhibit the transfer or water, corrosive liquids and steam or other hot vapors from outside of the garment to the wearer's body.

8. Section 1910.157 would be revised to read as follows:

§ 1910.157 Portable fire extinguishers.

(a) *Scope and application.* (1) These requirements shall apply to the placement, use, maintenance, and testing of portable fire extinguishers provided for the use of employees inside of workplace buildings and enclosed structures. Where an employer is using the exemption under paragraph (b)(1) of this section and where the extinguishers are provided but are not intended for employee use, the requirements of paragraphs (e) and (f) of this section shall apply.

(2) The requirements of paragraphs (c), (e), (f), and (g) of this section shall apply when an employer has provided extinguishers for employee use on the outside of workplace buildings or enclosure structures.

(b) *Exemptions.* (1) When the employer has established and implemented a written fire safety policy which requires the immediate and total evacuation of employees from the workplace upon the sounding of a fire alarm signal and which includes an emergency action plan and a fire prevention plan which meets the requirements of § 1910.38, the employer is exempt from the requirements of this section.

(2) When the employer has an emergency action plan meeting the requirements of § 1910.38 which designates certain employees to be the only employees authorized to use the available portable fire extinguishers and where all other employees in the immediate fire area are required to immediately evacuate upon the sounding of the fire alarm, the employer is exempt from the distribution requirements in paragraph (d) of this section.

(c) *General requirements.* (1) The employer shall mount, locate and identify portable fire extinguishers so that they are readily accessible to employees without subjecting the employees to possible injury.

(2) The employer shall provide portable fire extinguishers currently approved to meet the requirements of this section.

(3) Carbon tetrachloride and chlorobromomethane extinguishing agents are prohibited from use in portable fire extinguishers used by employees.

(4) The employer shall maintain portable fire extinguishers in a fully charged and operable condition and keep them in their designated places at all times except during use.

(5) The employer shall permanently remove from service by January 1, 1982 all soldered or riveted shell self-generating soda acid or foam portable fire extinguishers which operate by inverting the extinguisher to initiate an uncontrollable pressure generating chemical reaction to expel the agent.

(d) *Selection and distribution.* (1) The employer shall select and distribute portable fire extinguishers for employee use in a manner determined by the classes of anticipated workplace fires and by the size or degree of hazard which would affect their use.

(2) The employer shall distribute portable fire extinguishers for use by employees on Class A fires so that the travel distance to any extinguisher is limited to 75 feet (23 meters) or less.

(3) The employer may use uniformly spaced small hose stations installed for emergency use by employees instead of Class A portable fire extinguishers provided that such small hose systems meet the requirements of 29 CFR 1910.158 and that they provide total coverage of the area to be protected.

(4) The employer shall distribute portable fire extinguishers for use by employees on Class B fires so that the travel distance to any extinguisher is limited to 50 feet (15 meters).

(5) The employer shall distribute portable fire extinguishers used for Class C hazards on the basis of the distribution patterns for the Class A or Class B fires associated with the Class C hazard.

(6) The employer shall distribute portable fire extinguishers or other containers of Class D extinguishing agent for use by employees so that the travel distance is limited to 75 feet (23 meters). Portable fire extinguishers for Class D hazards are required only in those combustible metal working areas where combustible metal powders, flakes, shavings, or similarly sized products are generated on a daily basis.

(e) *Inspection, maintenance, and testing.* (1) The employer shall be responsible for the inspection, maintenance and testing of those portable fire extinguishers provided for employee use in the workplace.

(2) The employer shall conduct monthly inspections.

(3) The employer shall record the inspection dates for each extinguisher and make the record available to the Assistant Secretary upon request. Such records shall be kept one year after entry.

(4) The employer shall subject portable fire extinguishers, except stored pressure units, to a maintenance check at least annually.

(5) The employer shall empty and subject stored pressure dry chemical and Halon 1211 extinguishers that require a 12-year hydrostatic test to the applicable maintenance procedures every 6 years.

(6) The employer shall replace portable fire extinguishers removed from service for maintenance and recharging with spare extinguishers having the same classification and at least equivalent rating.

(f) *Hydrostatic testing.* (1) The employer shall ensure that hydrostatic testing be performed by trained persons with suitable testing equipment and facilities.

(2) The employer shall hydrostatically test portable extinguishers at the intervals listed in Table L-1 of this section.

TABLE L-1

Type of extinguishers	Test interval (yrs.)
Soda acid (soldered brass shells) (until 1/1/82)	*not permitted
Soda acid (stainless steel shell)	5
Cartridge operated water and/or antifreeze	5
Stored pressure water and/or antifreeze	5
Wetting agent	5
Foam (soldered brass shells) (until 1/1/82)	*not permitted
Foam (Stainless steel shell)	5
Aqueous film forming Foam (AFFF)	5
Loaded Stream	5
Dry chemical with stainless steel or soldered brass shell	5
Carbon dioxide	5
Dry chemical, stored pressure, with mild steel brazed brass or aluminum shells	12
Dry chemical, cartridge or cylinder operated, with mild steel	12
Halon 1211	12
Halon 1301	12
Dry powder, cartridge or cylinder operated with mild steel shells	12

*Extinguishers having shells constructed of copper or brass joined by soft solder or rivets shall not be hydrostatically tested and shall be removed from service by January 1, 1982.

(3) The employer shall hydrostatically test portable extinguishers when they show evidence of corrosion or mechanical injury.

(4) The employer shall perform hydrostatic tests on extinguisher hose assemblies which are equipped with a shutoff nozzle at the discharge end of the hose. The test interval shall be the same as specified for the extinguisher on which the hose is installed.

(5) The employer shall test carbon dioxide extinguishers and nitrogen or carbon dioxide cylinders used with wheeled extinguishers at ⅝'s of the service pressure as stamped into the cylinder every 5 years.

(6) The employer shall hydrostatically test all stored pressure and Halon 1211 types of extinguishers at the factory test pressure not to exceed two times the service pressure.

(7) The employer shall test acceptable self-generating type soda acid or foam extinguishers at 350 psi (2400 kPa).

(8) The employer shall test carbon dioxide hose assemblies requiring a hydrostatic pressure test at 1,250 psi (8,750 kPa).

(9) The employer shall test dry chemical and dry powder hose assemblies requiring a hydrostatic pressure test at 300 psi (2,100 kPa).

(10) The employer shall not use air or gas pressure for pressure testing.

(11) When extinguisher shells, cylinders, or cartridges fail a hydrostatic pressure test, the employer shall remove them from service and from the workplace.

(12) The equipment for testing cylinders and cartridges shall be of the water jacket type. The equipment shall be equipped with an expansion indicator which operates with an accuracy within 1% of the total expansion or .1cc of liquid.

(13) The employer shall test hose assemblies of carbon dioxide extinguishers that require a hydrostatic test within a protective cage device.

(14) In addition to the visual examinations required prior to testing, the employer shall also make an internal examination prior to the hydrostatic tests.

(15) The employer shall maintain and provide upon request to the Assistant Secretary evidence that the required hydrostatic testing of fire extinguishers has been performed at the time intervals shown in Table L-1. Such evidence shall include the date of test, the test pressure used, and the name or identification of the person or agency performing the test. Such records shall be kept for twelve years or as long as the extinguisher is in service whichever is less.

(16) Hose assemblies passing a hydrostatic test do not require any type of recording or stamping.

(g) *Training and education.* (1) Where the employer has provided portable fire extinguishers for employee use in the workplace, the employer shall provide an educational program to familiarize employees with the general principles of fire extinguisher use and the hazards involved with fighting fire of limited size.

(2) The employer shall provide the education required in paragraph (g)(1) of this section upon initial employment and at least annually thereafter.

(3) The employer shall provide employees, who have been designated to use fire fighting equipment as part of an emergency action plan, with hands-on training in the use of the appropriate equipment.

(4) The employer shall provide the hands-on training required in paragraph (g)(3) of this section upon initial assignment to the designated group of employees and at least annually thereafter.

9. Section 1910.158 would be revised to read as follows:

§ 1910.158 Standpipe and hose systems.

(a) *Scope and application.*—(1) *Scope.* This section contains the requirements for the components, water supply, testing and maintenance of standpipe and hose systems installed to meet the requirements of any OSHA standard.

(2) *Application.* This section applies to Class II and Class III systems which are installed for the use of employees.

(3) *Exception.* This section does not apply to Class I systems which are installed for use by full-time fire fighters trained in the handling and use of heavy hose streams.

(b) *Protection of standpipes.* The employer shall locate or otherwise protect standpipes against mechanical damage. Damaged standpipes shall be repaired promptly.

(c) *Equipment.*—(1) *Closets and cabinets.* Where reels or cabinets are provided to contain fire hose, the employer shall design them to facilitate prompt use of the hose valves, the hose, and other equipment at the time of fire or other emergency. The employer shall conspicuously identify and use reels and cabinets for fire equipment only.

(2) *Hose outlets and connections.* (i) The employer shall locate hose outlets and connectons high enough above the floor to avoid being obstructed and to be accessible to employees.

(ii) Where the pressure under static or dynamic conditions at any standpipe outlet exceeds 100 psi (700 kPa), the employer shall install an approved device at the outlet to reduce the pressure at the outlet to 100 psi (700 kPa) or less with the required water flow.

(iii) The employer shall standardize screw threads throughout the system and ensure that they are compatible with those used on supporting fire equipment. Use of adapters is permitted to provide compatibility.

(3) *Hose.* (i) The employer shall equip each 1½ each hose outlet with fire hose attached and ready for use.

(ii) The employer shall equip standpipe systems installed after July 1, 1980, for use by employees, with lined hose. Unlined hose may remain in use on existing systems. However, after the effective date of this standard, unlined hose which becomes unserviceable shall be replaced with lined hose.

(iii) Effective July 1, 1980, the employer shall provide hose of such length that friction loss resulting from water flowing through the hose will not decrease the pressure at the nozzle below 30 psi (210 kPa).

(4) *Nozzles.* Effective July 1, 1981 the employer shall equip standpipe hose with shut-off type nozzles.

(d) *Water supply.* The minimum water supply for standpipe and hose systems, which are provided for the use of employees, shall be sufficient to provide 100 gallons per minute (380 l/m) for a period of at least thirty minutes. The supply shall be sufficient to maintain a residual pressure of 65 pounds per square inch (455 kPa) at the topmost outlet with 100 gallons per minute (380 l/m) flowing.

(e) *Tests and maintenance.*—(1) *Acceptance tests.* (i) The employer shall hydrostatically test piping of new Class II and III systems including yard piping at not less than 200 psi (1400 kPa) for a period of at least 2 hours, or at 50 psi (350 kPa) in excess of normal pressure when such pressure is greater than 150 psi (1050 kPa).

(ii) The employer shall ensure that hose on all Class II and III systems installed after July 1, 1980, be hydrostatically tested with couplings in place, before being placed in service, at a pressure of not less than 200 psi (1400 kPa). This pressure shall be held for at least 14 seconds and not more than one minute during which time the hose shall not leak nor shall any jacket thread break during the test.

(2) *Maintenance and repairs.* (i) The employer shall keep water supply tanks filled to the proper level except during repairs. When pressure tanks are used the employer shall maintain proper pressure at all times except during repairs.

(ii) The employer shall keep valves in the main piping connections to the automatic sources of water supply fully open at all times except during repair.

(iii) The employer shall make inspections of systems at least semiannually and after each use to assure that all of the equipment and hose is in place, available for use, and in serviceable condition.

(iv) When any component of the system is found not to be serviceable the employer shall remove it from service immediately and replace it with equivalent protection.

(v) Hemp or linen hose on existing systems shall be unracked, inspected for deterioration, and reracked at least annually by the employer. The employer shall replace defective hose as specified in paragraph (c) (3) (ii) of this section.

(vi) The employer shall ensure that inspections are made by trained designated employees who can ensure that the equipment is in serviceable condition.

11. Section 1910.159 would be revised to read as follows:

§ 1910.159 Automatic sprinkler systems.

(a) *Scope and application.* (1) The employer shall install, maintain and test automatic sprinkler systems installed to meet other OSHA requirements in accordance with the requirements of this section.

(2) For automatic sprinkler systems used to meet OSHA requirements and installed prior to the effective date of this standard, the employer may continue compliance with the National Fire Protection Association (NFPA) or the National Fire Protection Association (NFPA) or the National Board of Fire Underwriters (NBFU) standard in effect at the time of the system's installation provided the older system is still in compliance with the appropriate NFPA or NBFU standard.

(b) *Exemptions.* Automatic sprinkler systems installed in workplaces for the sole purpose of providing property protection are exempt from the requirements of this section.

(c) *General requirements.*—(1) *Design.* (i) All automatic sprinkler designs used to comply with this standard, whether hydraulic or pipe schedule, shall be capable of providing the necessary discharge patterns, densities, and water flow characteristics for complete coverage in a particular workplace or zoned subdivision of the workplace.

(ii) The employer shall use only approved equipment and devices in the design and installation of automatic sprinkler systems used to comply with this standard.

(2) *Maintenance.* The employer shall properly maintain an automatic sprinkler system installed to comply with this standard at all times.

(3) *Acceptance tests.* The employer shall conduct proper acceptance tests on sprinkler systems installed for employee protection after the effective date of this standard and record the dates of such tests. Proper acceptance tests include the following:

(i) Flushing of underground connections.

(ii) Hydrostatic tests of piping in system.

(iii) Air tests in dry-pipe systems.

(iv) Dry-pipe valve operation.

(v) Test of drainage facilities.

(4) *Water supplies.* The employer shall provide every automatic sprinkler system with at least one automatic water supply. The water supply shall be capable of providing design water flow for at least 30 minutes. An auxiliary water supply or a mandatory employee evacuation plan shall be provided when the automatic water supply is out of service. Auxiliary water supplies are not required for systems of 20 or less sprinkler heads.

(5) *Hose connections for fire fighter use.* The employer may attach hose connections for fire fighting use to wet pipe sprinkler systems in other than high hazard workplaces provided that the water supply satisfies the designed demand for sprinklers and standpipes combined.

(6) *Protection of piping.* The employer shall protect automatic sprinkler system piping against freezing and exterior surface corrosion.

(7) *Drainage.* The employer shall install all dry sprinkler pipe and fittings so that the system may be totally drained.

(8) *Pipe cutting.* The employer shall not permit torch cutting as a means of modifying or repairing sprinkler systems.

(9) *Sprinklers.* (i) The employer shall use only approved sprinklers on systems.

(ii) The employer may use older style sprinklers to replace similar style sprinklers, but not for replacing standard sprinklers without a complete engineering review of the system.

(iii) The employer shall protect sprinklers which are located so as to be subject to mechanical injury from such injury with effective guards.

(10) *Sprinkler alarms.* On all sprinkler systems having more than twenty (20) sprinklers, the employer shall provide a local waterflow alarm which sounds an audible signal upon water flow through the system equal to that from a single automatic sprinkler.

(11) *Sprinkler spacing.* The employer shall space sprinklers to provide a definite maximum protection area per sprinkler, a minimum of interference to the discharge pattern by building or structural members, or building contents and suitable sensitivity to possible fire hazards. The minimum vertical clearance below and between heads and obstructions shall be 18 inches.

(12) *Hydraulically designed systems.* The employer shall identify hydraulically designed automatic sprinkler systems or portions thereof and indicate the location, number of sprinklers in the hydraulically designed section, and the basis of the design. Central records may be used in lieu of signs at sprinkler valves provided the records are available for inspection and copying by the Assistant Secretary.

11. Section 1910.160 would be revised to read as follows:

§ 1910.160 Fixed extinguishing systems, general.

(a) *Scope and application.* (1) This section applies to all fixed extinguishing systems installed to meet a particular OSHA standard.

(2) This section also applies to fixed systems not installed to meet a particular OSHA standard, but which, by means of their operation, could expose employees to possible injury, death, or adverse health consequences. Such systems shall meet the requirements of paragraph (b)(4) through (b)(7) and (c) of this section.

(3) Systems covered in paragraph (a)(2) of this section installed in areas with no employee exposure are exempted from the requirements of this section.

(b) *General requirements.* (1) Fixed extinguishing systems, components, and agents shall be designed and approved for use on the specific fire hazards they are expected to control or extinguish.

(2) If for any reason a fixed extinguishing system becomes inoperable, the employer shall notify employees and take the necessary temporary precautions to ensure their safety until the system is restored to operating order. Any defects or impairments shall be properly corrected by competent personnel.

(3) The employer shall provide a distinctive alarm capable of being perceived above ambient noise or light levels on all systems in the protected area to indicate that the system is discharging.

(4) The employer shall provide a distinctive alarm capable of being perceived above ambient noise or light levels to warn employees against reentry into discharge areas where the atmosphere remains hazardous to employee safety and health.

(5) The employer shall post hazard warning or caution signs at the entrance to, and inside of, areas protected by fixed extinguishing systems which use agents known to be hazardous to employee safety and health.

(6) The employer shall ensure that fixed systems are inspected annually by a person knowledgeable in the designed function of the system to ensure that the system is maintained in an operating condition.

(7) The employer shall check the weight and pressure of refillable containers at least semi-annually. If the container shows a loss in net content or weight of more than 5%, or a loss in pressure of more than 10%, it shall be

subjected to maintenance. Records of semi-annual checks shall be kept available at the workplace for at least six-months after entry.

(8) The employer shall weigh factory charged nonrefillable containers which have no means of pressure indication at least semi-annually. If a container shows a loss in net weight of more than 5% it shall be replaced.

(9) The employer shall record inspection and maintenance dates on the container or on a tag attached to the container.

(10) The employer shall train employees designated to inspect, maintain, operate, or repair fire extinguishing systems and periodically review their training to keep them up-to-date in the functions they are to perform.

(11) The employer shall not use chlorobromomethane or carbon tetrachloride as an extinguishing agent.

(12) The employer shall coat system components installed out of doors or in the presence of corrosive atmospheres to protect against corrosion.

(13) Automatic detection equipment shall be approved, installed and maintained in accordance with 29 CFR 1910.164.

(14) The employer shall assure that all systems are designed to operate properly between −20° F (−40° C) and 130° F (54° C). Systems designed for and installed in areas with climatic extremes shall also be capable of operation at the expected extreme temperature levels.

(15) In engineered systems, the employer shall assure that the rate of application of an agent is such that the designed concentration can be reached within 30 seconds of initial discharge.

(16) In systems using agent concentrations exceeding the maximum safe level for the agent, the employer shall assure that automatic actuation be by means of an approved automatic fire detection device installed and interconnected to an alarm system to ensure the safe egress of employees from the discharge area prior to actuation.

(17) The employer shall provide at least one manual station for discharge activation of fixed extinguishing system.

(18) The employer shall identify manual operating devices as to the hazard they protect.

(19) The employer shall provide, and make readily available, the personal protective equipment needed to rescue employees trapped in hazardous atmospheres created by an agent discharge near the protected area.

(20) The employer shall provide a means of egress from the discharge area in accordance with 29 CFR Part 1910, Subpart E.

(c) *Total flooding systems with potential health and safety hazards to employees.* (1) The employer shall provide an emergency action plan in accordance with 29 CFR 1910.38 for each area within a workplace that is protected by a total flooding system which provides agent concentrations exceeding the maximum safe levels set forth in 29 CFR 1910.162.

(2) Those systems installed in areas where employees cannot enter during or after the system operates are exempt from this paragraph.

(3) The employer shall provide a predischarge alarm which will operate at least 30 seconds before the system discharges on all total flooding systems under the scope of this paragraph.

13. Section 1910.161 would be revised to read as follows:

§ 1910.161 Fixed extinguishing systems, dry chemical.

(a) *Scope and application.* This section applies to all fixed extinguishing systems installed in accordance with 29 CFR 1910.160 and using dry chemical as the extinguishing agent.

(b) *Specific requirements.* (1) Dry chemical agents designed to be used in combination with foams or wetting agents shall be approved for such use.

(2) The employer shall not mix dry chemicals of different compositions together. Systems designed for use with one chemical shall not be refilled with any other type.

(3) When dry chemical discharge may cause visual obscuration, the employer shall provide a predischarge alarm for employees to safely egress from the discharge area. The predischarge alarm shall activate at least 30 seconds before release of the agent.

(4) The employer shall sample the dry chemical supply in all except stored pressure systems from the top center of the supply tank and near the tank wall, at least annually, to determine if lumps exist which are harder than will be easily crumbled or reduced to powder when dropped from a height of 4 inches (10 cm).

14. The heading for the existing § 1910.162 would be deleted and a new §1910.162 would be added to read as follows:

§ 1910.162 Fixed extinguishing systems, gaseous agent.

(a) *Scope and application.* This section applies to all fixed extinguishing systems installed in accordance with 29 CFR 1910.160 and using a gas as the extinguishing agent. In some cases, the gas may be in a liquid state during storage.

(b) *Specific Requirements.* (1) Agents used for initial supply and replenishment shall be of the type approved for the system's application. Carbon dioxide obtained by dry ice conversion to liquid is not acceptable unless it is processed to remove excess water and oil.

(2) The employer shall maintain inerting type gaseous extinguishing concentrations by minimizing leakage from the enclosure or by applying extra gas if necessary.

(3) The designed extinguishing concentration for surface fires shall be achieved with a minimum development of toxic decomposition products.

(4) The employer shall assure that the designed extinguishing concentration for deep-seated fires is maintained for at least seven minutes after the initial discharge. It shall also be maintained for a sufficient period of time to allow the smoldering to be extinguished and the material to cool to a point which reignition will not occur when the inert atmosphere is dissipated.

(5) The employer shall provide a maximum discharge time of 30 seconds to reach the design concentration on all gaseous agent systems.

(6) When fire brigades will perform designated emergency actions under the emergency action plan meeting the requirements of § 1910.38, the employer shall assure that an effective agent concentration be maintained for a sufficient period of time to allow for effective emergency actions.

(7) The employer shall provide a distinctive pre-action or pre-discharge alarm capable of being perceived above ambient light or noise levels when agent concentrations exceed the maximum safe level for employee exposure. The maximum safe levels for employee exposure without using personal protective equipment are as follows:

(i) For carbon dioxide, 4%; or

(ii) For Halon 1301, 10%; or

(iii) For Halon 1211, 4%.

(8) The employer shall not use Halon 1301 in concentrations greater than 10% in areas normally occupied by employees unless the protected spaces are to be evacuated by employees immediately after discharge of the agent or sooner. Where egress from an area cannot be accomplished within one minute, the employer shall not use Halon 1301 in concentrations greater than 7%. Halon 1301 concentrations are permitted greater than 10%, but less than 15%, in areas not normally occupied by employees provided egress can be accomplished within 30 seconds. Where concentrations can exceed 15%, the employer shall prevent employee exposure to the gas.

(9) The employer shall not use Halon 1211 or carbon dioxide in areas normally occupied by employees except where safe emergency egress can be assured in less than 30 seconds from the time of agent discharge.

(10) The employer shall base the quantity of inerting type gaseous extinguishing agent required on the total rate of discharge needed to blanket the area or volume protected and the time that the discharge must be maintained to assure complete extinguishment.

15. Section 1910.163 would be revised to read as follows:

§ 1910.163 Fixed extinguishing systems, water spray and foam.

(a) *Scope and application.* This section applies to all fixed extinguishing systems installed in accordance with 29 CFR 1910.160 and using water or foam solution as the extinguishing agent. This section does not apply to automatic sprinkler systems which are covered under 29 CFR 1910.159.

(b) *Specific requirements.* (1) The employer shall not use foams to extinguish fires involving gases, liquified gases with boiling points below ambient workplace temperatures such as butane, butadiene, propane, or cryogenic liquids.

(2) The employer shall not use foams or water spray to extinguish fires in materials which react violently with water, such as metallic sodium and metallic potassium.

(3) The employer shall not use regular foams for polar solvent liquids.

(4) The employer shall not mix different types of foam concentrates because they may be incompatible.

(5) The employer shall not permit foams, other than alcohol foams, to be discharged through foam spray devices onto fires involving water soluble solvents in depths exceeding on inch (2.5 cm).

(6) The employer shall assure that water spray systems be designed so that extinguishment or control can be accomplished and so that all necessary surfaces can be cooled sufficiently to prevent "flash back" occurring after the system is shut off.

(7) The employer shall assure that drainage of water spray systems be directed to locations away from employee work areas.

16. The existing § 1910.164 would be renumbered § 1910.165 and a new § 1910.164 would be added to read as follows:

§ 1910.164 Fire detection systems.

(a) *Scope and application.* This section contains the requirements for automatic fire detection systems installed to meet the requirements of a particular OSHA standard.

(b) *Installation and restoration.* (1) The employer shall assure that all devices, combination of devices, and equipment constructed and installed to comply with this standard be approved for the purpose for which they are intended.

(2) The employer shall restore all fire detection systems and components to normal operating condition as promptly as possible after each test or alarm. Spare detection devices and components which are normally destroyed in the process of detecting fires shall be kept stocked in quantities and locations to be available for prompt restoration of the system.

(c) *Maintenance and testing.* (1) The employer shall maintain all systems in an operable condition.

(2) The employer shall test and adjust the sensitivity and reliability of fire detectors and the fire detection system as often as needed to maintain proper operating conditions.

(3) The employer shall assure that pneumatic and hydraulic operated detection systems installed after July 1, 1980, be equipped with supervised systems.

(4) The employer shall assure that the servicing, maintenance and testing of fire detection systems be performed by a trained person knowledgeable in the operations and functions of the system.

(5) The employer shall clean fire detectors, that need to be cleaned of dirt, dust or other particulates in order to be fully operational at regular and periodic intervals. The cleaning operation and checking procedure, and necessary sensitivity adjustments shall be done by a trained person knowledgeable in the proper function and servicing of the equipment.

(d) *Protection of fire detectors.* (1) The employer shall protect fire detection equipment installed out of doors or in the presence of corrosive atmospheres from corrosion. The employer shall provide detection equipment requiring protection from the weather with a canopy, hood, or other suitble protection.

(2) The employer shall locate or otherwise protect detection equipment so that it is protected from mechanical or physical impact.

(3) The employer shall support detectors independently of their attachment to wires or tubing.

(e) *Response time.* (1) The employer shall assure that fire detection systems installed primarily for the purpose of actuating fire extinguishment or suppression systems shall be designed to operate in time to control or extinguish a fire.

(2) The employer shall assure that fire detection systems installed for the purpose of employee alarm and evacuation be designed and installed to allow sufficient time for safe escape of employees.

(3) The employer shall not delay alarms or devices initiated by fire detector actuation more than 30 seconds unless the actions are not necesary for immediate safety of employees. In such cases the emergencey action plan shall assure employees be notified, or extinguishment be actuated, in sufficient time to assure the safety and health of employees.

(f) *Number, location and spacing of detecting devices.* The employer shall assure that the number, spacing and location of fire detectors is based upon design data obtained from field experience or tests, engineering surveys, the manufacturer's recommendations, or recognized testing laboratory listing.

17. A new § 1910.164a would be added to read as follows:

§ 1910.164a Employee alarm systems.

(a) *Scope and application.* (1) The requirements of this section shall apply to all emergency alarms or alarm systems installed and used to meet a particular OSHA standard. This section does not appy to those pre-discharge, discharge, or supervisory alarms required on various fixed extinguishing systems.

(2) The requirements in this section that pertain to maintenance, testing and inspection shall apply to all local fire alarm signaling systems used for alerting persons regardless of function.

(b) *General requirements.* (1) The employer shall provide employees with an alarm system which will provide sufficient reaction time to safely escape from a life threatening emergency in the workplace.

(2) The employee alarm shall be capable of being perceived above ambient noise or light levels by all employees in the affected portions of the workplace. Tactile devices may be used to alert those employees who would not be otherwise able to recognize the audible or visual alarm.

(3) The employee alarm shall be distinctive and recognizable to employees as a signal to perform actions designated under the emergency action plan.

(4) The employer shall explain the preferred means of reporting emergencies, such as by manual pull-box alarms or by telephone, to each employee. The employer shall post emergency telephone numbers near telephones, on employee notice boards, and other conspicuous locations.

(c) *Installation and restoration.* (1) The employer shall assure that all devices, components, combinations of devices or systems constructed and installed to comply with this standard be approved. Steam whistles, air horns, strobe lights or similar lighting devices, or tactile devices meeting the requirements of this section shall be considered acceptable in meeting this requirement for approval.

(2) The employer shall restore employee alarm systems to normal operating condition as promptly as possible after each test or alarm The employer shall maintain a stock of the necessary spare alarm devices and components subject to wear or destruction in quantities and locations for prompt restoration.

(d) *Maintenance and testing.* (1) The employer shall maintain all employee alarm systems in operating condition.

(2) The employer shall make a test of the reliability and adequacy of the employee alarm system at bi-monthly intervals. A different actuation device shall be used in each test so that no individual device is used for two consecutive tests.

(3) The employer shall maintain or replace power supplies as often as is necessary to assure a fully operational condition. Back-up means of alarm shall be provided when systems are out of service (i.e., employee runners, telephone, etc.).

(4) The employer shall assure that employee alarm systems installed after July 1, 1980 be supervised in such a manner that system failure to remain operational will result in a positive notification to assigned personnel that a deficiency exists in the system.

(5) The employer shall assure that the servicing, maintenance and testing of employee alarms be done by persons trained in the designed operation and functions necessary for reliable and safe operation.

(e) *Manual operation.* (1) The employer shall ensure that manually operated pull boxes for use in conjuction with employee alarms be unobstructed, conspicuous and readily accessible. The employees shall not have to travel more than 200 feet (61 meters) to reach a manual pull box device or a telephone in the alarm system area.

(2) Manual fire alarm pull boxes shall be approved.

18. As renumbered (see proposed change no. 17), § 1910.165 would read as follows:

§ 1910.165 Fire brigades.

(a) *Scope and application.*—(1) *Scope.* This section contains requirements for the organization, training, and personal protective equipment of fire brigades.

(2) *Application.* The requirements of this section apply to employees who are members of fire brigades. The requirements of this section also apply to industrial fire departments or to "private" or contractual type fire departments. The requirements of this section do not apply to airport crash rescue or forest firefighting operations.

(b) *Organization.*—(1) *Organizational statement.* The employer shall prepare and maintain a statement or written policy which establishes the existence of a fire brigade and which describes the functions that the fire brigade is to perform at the workplace and it shall be available for inspection by the Assistant Secretary or by employees or their designated representatives.

(2) *Personnel.* The employer shall ensure that employees who are expected to do interior structural fire fighting are physically capable of performing duties which may be assigned to them during emergencies or other operations. The employer shall not permit employees with known heart disease, epilepsy, or emphysema, to participate in fire brigade emergency activities unless permitted by a certificate from a licensed physician.

(c) *Training.* (1) The employer shall provide training commensurate with those functions that the fire brigade is expected to perform.

(2) The employer shall assure that training conducted frequently enough to assure that assigned duties and functions will be performed satisfactorily and in a safe manner so as not to endanger brigade members or other employees. At a minimum, training shall be conducted annually.

(3) The employer shall assure that training for members of the fire brigade includes hands-on training, where members operate the equipment which they are expected to use and perform those operations brigade members are expected to perform during emergency situations.

(4) The employer shall inform fire brigade members about special hazards to which they may be exposed during fire and other emergencies. They shall also be advised of any changes that occur in relation to the special hazards. The employer shall develop procedures that describe the actions to be taken in situations involving the special hazards.

(d) *Firefighting equipment.* The employer shall maintain and periodically inspect firefighting equipment to assure the safe operational condition of the equipment.

(e) *Protective clothing.* The following requirements apply only to those employees who perform interior structural firefighting. (1) *General.* (i) The employer shall ensure that protective clothing ordered or purchased after July 1, 1980, meets the requirements contained in this paragraph. As the new equipment is provided, the employer shall assure that all brigade members wear it. The employer shall assure that brigade members wear protective clothing meeting the requirements of this paragraph after July 1, 1985.

(ii) The employer shall assure that brigade members wear protective clothing while performing interior structural firefighting.

(iii) The employer shall assure that protective clothing protects the head, body, and extremities, and consists of at least the following components: foot and leg protection; hand protection; body protection; eye, face and head protection.

(2) *Foot and leg protection.* (i) Foot and leg protection shall be achieved by one of the following methods: (*a*) Fully extended boots which meet the requirements of paragraph (e)(2) and which provide protection for the legs;

(*b*) Protective shoes or boots which meet the requirements of paragraph (e)(2) and which are worn in combination with protective trousers that meet the requirements of paragraph (e)(3).

(ii) Protective footwear shall meet the requirements of § 1910.136 for class 75 footwear. In addition, protective footwear shall be water-resistant for at least five inches (12.7 cm) above the bottom of the heel and shall be equipped with slip-resistant outer soles.

(iii) When tested in accordance with "Military Specification for Fireman's Boots," MIL-B-2885D (1973 and amendment dated 1975), protective footwear shall provide protection against penetration of the midsole by a size 8D common nail when at least 300 pounds of static force is applied to the nail.

(3) *Body protection.* (i) Body protection shall be coordinated with foot and leg protection to ensure full body protection for the wearer. This shall be achieved by one of the following methods: (*a*) Wearing of a fire-resistive coat meeting the requirements of this paragraph in combination with fully extended boots meeting the requirements of this paragraph;

(*b*) Wearing of a fire-resistive coat in combination with protective trousers both of which meet the requirements of this paragraph.

(ii) The performance, construction, and testing of fire-resistive coats and protective trousers shall be at least equivalent to the requirements of the National Fire Protection Association (NFPA) standard NFPA No. 1971-1975, "Protective Clothing for Structural Fire Fighting," with the following permissible variations in those requirements: (*a*) Liner may be detachable but the shell is not permitted to be worn without the liner while performing interior structural fire fighting.

(*b*) To achieve increased ventilation of trapped body heat, the outer shell and vapor barrier may be penetrated by ventilation openings protected by non-metallic flame resistant material equal to this standard.

(*c*) Tearing strength of the outer shell shall be a minimum of eight pounds in any direction.

(*d*) The criteria for flame resistance of the outer shell, including that of trim, after the removal of the test flame shall be:

Maximum after-flame 2.0 seconds
Maximum after-glow 4.0 seconds
Average char-length 6.0 inches

(*e*) The outer shell and lining may char or discolor but must retain heat resistance and shall not separate or melt when placed in a forced air laboratory oven at a temperature of 500°F (260°C) for a period of five minutes.

(4) *Hand protection.* (i) Hand protection shall consist of protective gloves or glove system which allow dexterity of hand movement and sense of feel for objects.

(ii) Exterior material of protective gloves shall provide resistance against abrasion, puncture, and absorption of liquids.

(iii) Exterior material of gloves shall be fire resistant. Materials shall be tested by Federal Test Method 191, method 5903 (1971); maximum allowable after flame shall be 2.0 seconds and the maximum char length shall be 4.0 inches (10.2 cm.).

(iv) Protective gloves or glove system shall provide thermal insulation. When tested in accordance with National Institute for Occupational Safety and Health (NIOSH) publication, "The Development of Criteria for Firefighters' Gloves; Vol. II: Glove Criteria and Test Methods" (1976), such thermal insulation shall be sufficient so that the temperature inside the palm and gripping surface of the fingers of the gloves shall not exceed 111°F (44°C) when gloves or glove system are exposed to 932°F (500°C) for five seconds at 4 psi (28 kPa) pressure.

(v) When design of the fire-resistive coat does not otherwise provide protection for the wrists, protective gloves shall have wristlets of at least 4.0 inches (10.2 cm) in length to protect the wrist area when the arms are extended upward and outward from the body.

(5) *Head, eye and face protection.* (i) Head protection shall consist of a protective head device with ear flaps and chin strap which meet the performance, construction, and testing requirements of the National Fire Safety and Research Office of the National Fire Prevention and Control Administration, U.S. Department of Commerce, which are contained in "Model Performance Criteria for Structural Fire Fighters' Helmets" (August 1977).

(ii) Protective eye and face devices which comply with § 1910.133 shall be used by brigade members when performing operations where the hazards of flying or falling materials are present and which may cause eye and face injuries. Protective eye and face devices provided as accessories to protective head devices (face shields) are permitted when such devices meet the requirements of § 1910.133.

(iii) Fire brigade members wearing full facepieces of breathing apparatus meeting the requirements of § 1910.134 and paragraph (f) of this section, shall be acceptable as meeting the eye and face protection requirements of this paragraph.

(f) *Respiratory protection devices.*— (1) *General requirements.* (i) The employer shall assure that respiratory protective devices worn by brigade members meets the requirements contained in § 1910.134 and the requirements contained in this paragraph.

(ii) Approved self-contained breathing apparatus with full-facepiece shall be worn by brigade members while working inside buildings or confined spaces where there is dense smoke or an oxygen deficiency. Such apparatus shall also be worn during emergency situations involving toxic substances.

(iii) Approved self-contained breathing apparatus shall be acceptable if equipped with a "buddy breathing" device or a quick disconnect valve. If these accessories are used, they shall not cause damage to the apparatus, or restrict the air flow of the apparatus, or obstruct the normal operation of the apparatus.

(iv) Approved self-contained compressed air breathing apparatus shall be acceptable when used with approved cylinders from other approved self-contained compressed air breathing apparatus when such cylinders are of the same size and pressure rating. All compressed air cylinders used with self-contained breathing apparatus shall meet DOT and NIOSH criteria.

(v) Self-contained breathing apparatus shall have a minimum service life rating of 30 minutes in accordance with the methods and requirements of the Mine Safety and Health Administration (MSHA) and NIOSH.

(vi) The employer shall clean and recharge each breathing apparatus after each use. Self-contained breathing apparatus shall be stored in such a manner that it will be maintained in a clean and operable condition.

(vii) Self-contained breathing apparatus shall be provided with an indicator which automatically sounds an audible alarm when the remaining service life of the apparatus is reduced to within a range of 20 to 24 percent of its rated service time.

(2) *Positive-pressure breathing apparatus.*

(i) The employer shall assure that self-contained breathing apparatus purchased after July 1, 1980, be of the pressure-demand or other positive-pressure type when such apparatus is worn by brigade members while performing interior structural fire fighting operations. Effective July 1, 1983, this requirement applies to all self-contained breathing apparatus when used while performing interior structural fire fighting.

(ii) This requirement does not prohibit the use of a combination type self-contained breathing apparatus where the apparatus can be switched from a demand to a positive-pressure mode. However, such apparatus shall be in the positive-pressure mode when brigade members are performing interior structural fire fighting operations.

(iii) Effective July 1, 1985, new positive-pressure breathing apparatus, including full-facepiece, shall be capable of performing in temperatures down to −20°F (−40°C) without malfunction or loss of respiratory protection to the wearer for the duration of the equipment.

§§ 1910.165, 1910.165a and 1910.165b [Revoked]

19. Sections 1910.165, 1910.165a and 1910.165b would be revoked.

20. It is proposed to amend 19 CFR Part 1010 by adding the following appendices after the appropriate subparts.

APPENDIX A TO SUBPART E—EMPLOYEE FIRE SAFETY PLANS

A. *Emergency Action Plan*—1. *Development.* Every employer is encouraged to develop an Emergency Action Plan (EAP). Small employers, those with 10 or fewer employees, may develop an EAP and convey it to their employees orally, but larger employers are encouraged to post the plan at the main entrance of buildings or other employee frequented areas as a reminder to employees. The employer should consult employees in the affected areas and company safety or fire safety officials, along with local fire safety officials and consultants knowledgeable in evacuation procedures and related hazards concerning the formation of the EAP. The employer should assure that the EAP provides for contingencies that could reasonably be expected because of the nature of the serious hazards in the workplace such as toxic gas leaks, power failure, fire or explosion.

2. *Refuge or safe areas.* The designation of refuge areas for safe evacuation should be determined and identified in the EAP. In a building divided into fire zones by fire walls, the refuge area may still be within the same building but in a different zone from where the emergency occurs. Exterior refuge or safe areas may include parking lots, open fields or streets which are located away from the site of the emergency and which provide sufficient areas to accommodate the employees. Employees should be instructed to move away from the exit discharge doors of the building, and to avoid congregating close to the building where they may hamper emergency operations.

3. *Employee notification.* The employer, as part of the effort to put the EAP into effect, should assure that all affected employees understand their responsibilities upon being alerted of an emergency. All new affected employees should be informed of what their responsibilities are under the plan during their job orientation. If an

emergency action team or fire brigade has been organized, its firefighting as well as evacuation assistance role should be included in the plan.

4. *Workplaces with more than one employer.* In buildings with several places of employment, employers are encouraged to coordinate their EAP with the other employers in the building. A building-wide or standardized plan for the whole building is acceptable provided each employer informs the employees of their duties and responsibilities under the plan. The standardized plan need not be kept by each employer in the multi-employer building, provided there is an accessible location within the building where the plan can be reviewed by affected employees. When multi-employer building-wide plans are not feasible, employers should coordinate their plans with the other employers within the building to assure that conflicts or confusion are avoided during times of emergencies. In multi-story buildings where more than one employer is on a single floor, it is essential that these employers coordinate their plans with each other to avoid conflicts and confusion.

5. *Reporting emergencies.* In small workplaces where direct vocal communication, such as shouting or loud talking by a person, is possible for alerting all employees of an emergency, then this system may be used as the alarm system. Where workplaces are so organized or arranged that a single person shouting an alarm will not be promptly perceived by all employees, then other methods such as telephones, a local fire alarm signalling system, loud speaker voice communication system or others would be necessary.

6. *Evacuation.* Delayed and partial evacuation may be used by employers, who will require designated employees to remain behind to shut down machinery, processes or other actions and then evacuate the area. Such delayed evacuation procedures should provide for contingencies when the emergency is so severe that employees should leave immediately and not remain behind for shutdown procedures. Partial evacuation may be used where the employer has designated certain employees as members of the fire brigade to remain and attack the fire or other hazard.

7. *Training.* In areas where handicapped employees are working, employers are encouraged to develop a buddy system, or other means of assisting the handiccapped employee's evacuation. When the buddy system is used, the employer should instruct the employees in the evacuation procedures to be used.

b. *Fire Prevention Plans—1. Development.* Every employer is encouraged to develop a fire prevention plan to enhance employee awareness of workplace fire hazards. The employer should consult company fire safety officials, employees and local fire marshals before the plan is finalized. These consultation activities would assure that all ignition and fuel sources are included in the plan. The plan should include the maintenance schedule information that is necessary to assure the proper operation of plant equipment to avoid an unwanted fire. Housekeeping activities and related control of fuel sources should be fully addressed in the plan. Activities such as cleaning up after each shift and the disposal of combustible waste, should be part of the plan. The storage and handling of combustible raw materials such as flammable liquids, solids and gases should be part of the plan. The employer is encouraged to designate a person or persons on each shift who can be responsible for handling complaints concerning malfunctioning equipment and poor housekeeping in work areas. These activities which take place only on the outside of buildings need not be included in the plan though the employer is encouraged to do so.

2. *Employee notification.* The employer as part of effort to put the plan into effect should assure that all affected employees are aware of what they are expected to do under the plan. All new employees should be informed during their job orientation of what their duties are under the plan. The maintenance crew or team should be fully informed of the plan requirements for malfunctioning equipment which may be an ignition source. Employee responsibilities under the plan may be accomplished by the use of job sheets for each work area or it can be written in the form of a plan of action for the overall workplace.

Appendix B to Subpart L

I. Portable Fire Extinguishers

A. *Mounting.* Portable fire extinguishers may be mounted on hooks, brackets, or other devices provided the device will adequately support the extinguisher. Extinguishers should be mounted at a height where employees can remove them from their mounting device without injury. In cases where extinguishers can be struck by moving vehicles such a tow-motors, elevating mounting boards may be used to lift the extinguisher up to a safe height provided the extinguisher can be lowered and ready for use within one minute.

B. *Selection and Distribution—1. Selection.* Extinguishers for protecting Class A hazards may be selected from the following types: water, foam, loaded stream, or multipurpose dry chemical. Extinguishers for Class B hazards may be selected from the following types: Halon 1301, Halon 1211, carbon dioxide, dry chemicals, foam, or loaded stream. Extinguishers for Class C hazards may be selected from the following types: Halon 1301, Halon 1211, carbon dioxide, or dry chemical. Class D fire hazards pose a problem in that there are few approved agents available in the marketplace. What agents are available are generally limited to one or a single class of metal hazard. In cases when an approved agent is uanavailable for a specific workplace Class D hazard, the following alternative agents are recommended for general use:

1. Foundry flux,
2. Graphite powder,
3. Dry sand,
4. Dry dolomite, and
5. Dry talc, (powder).

The above listed agents have the ability to control if not extinguish many Class D fires found in most industrial operations. Because water can increase the severity of a Class D fire, these agents must be kept dry. Additional agents can be found by referring to any general fire protection engineering publication. When the employer selects the types of extinquishers for use against other than Class D hazards, he should make sure that the extinguisher has been listed or approved by a nationally recognized testing laboratory. Such a list or approval assure the employer of the reliability of the unit he has purchased. For radioactive combustible metal hazards, the employer should contact the Nuclear Regulatory Commission for recommendations.

In the selection of an extinguisher, the employer should give consideration to the health and safety hazards involved in the maintenance and use of the unit. Bromotrifluoromethane (Halon 1301) and bromochlorodifluoromethane (Halon 1211) extinguishers contain extinguishing agents whose vapor has a low toxicity. However, their decomposition products can be more hazardous. Employees should be instructed about the hazards of breathing the decomposition vapors. Dry chemical extinguishers used in small unventilated work areas may reduce visibility for up to several minutes.

2. *Distribution.* The following tables give recommended distribution patterns for Class A and Class B fire extinguishers:

Class A Hazards

	Hazard classification		
	Low	Ordinary	High
Minimum extinguisher rating	1A	2A	2A
Maximum floor area/unit of A	3,000 sq. ft.	1,500 sq. ft.	1,000 sq. ft.
Maximum floor area/extinguisher	11,250 sq. ft.	11,250 sq. ft.	11,250 sq. ft.
Maximum travel distances	75 ft.	75 ft.	75 ft.

Class B Hazards

	Hazard classification		
	Low	Ordinary	High
Basic minimum rating	5B/10B	10B/20B	20B/40B
Maximum travel distance	30 ft./50 ft.	30 ft./50 ft.	30 ft./50 ft.

Even though these tables are recognized as being an acceptable means for compliance, they do not preclude other distributions which can be shown to provide for adequate employee life safety; alternative distribution is acceptable. For example, where an employer provides an employee fire brigade as permitted in paragraph 1910.157(b)(2), portable equipment can be installed on special trucks or in special storage areas known to the fire brigade. Such distributions should recognize and provide for OSHA's intent of providing employee life safety in a fire emergency. Distribution patterns for Class C hazards should be based upon the Class B patterns. Distribution of Class D extinguishers should be based upon the 75 foot travel distance requirement in the standards.

C. *Inspection, maintenance and testing.* A reputable fire equipment servicing agency is usually the most reliable means available to the employer for having maintenance and recharging performed. Larger employers may find it desirable to establish their own maintenance and recharge facilities and train employees to perform these functions. In such cases the service manuals and parts lists for the equipment should be obtained from the extinguisher manufacturer. Any employer who elects to inspect, maintain or test portable fire extinguishers should become familiar with the methods and equipment recommended in the references in Appendix C.

D. *Installation.* Portable fire extinguishers installed and maintained in accordance with NFPA No. 10-1975 Standard for Portable Fire Extinguishers, are considered in compliance with this standard.

II. STANDPIPE AND HOSE SYSTEMS

A. *Pre-fire planning.* It is suggested that a pre-fire plan be coordinated with the local fire department. Such a plan would eliminate the unnecessary handling of hose by arriving fire departments. It would also assure that hose couplings used by the plant and the local fire department would be compatible.

B. *Protection of standpipes:* Standpipes may be protected by guards such as expanded metal cages, enclosure in walls, or bumper poles. Standpipes are considered damaged when they have been punctured or ruptured, creased or dented enough to restrict water flow, or have had components such as valves, valve wheels or handles or other devices removed or broken.

C. *Equipment.* 1. Hose should be considered unserviceable when it is visually inspected and found to be punctured, rotted, mildewed, or similarly damaged. Other standpipe and hose system equipment should be considered unserviceable when it is no longer capable of providing the service for which it was approved.

2. Hemp or linen hose can become damaged if it is not properly dried after use. If this hose is stored in a damp or wet condition, it will deteriorate.

3. Spray-type nozzles provide more effective fire control than straight-stream types. Solid stream nozzles may contribute to the spread of a fire by scattering burning materials. Employers should assure that employees are aware of the type of nozzles used on workplace hose systems.

4. Standardized hose coupling screw threads are necessary to provide effective use of fire hose provided by different fire companies. The American National Fire Hose Connection Screw Thread should be used whenever it complements existing equipment. However, certain geographical areas of the country have adopted other standard threads. The employer is encouraged to check with local supporting fire departments to determine what thread is used so that equipment purchased for use in the workplace can be compatible.

D. *Design and installation.* Standpipe and hose systems designed and installed in accordance with NFPA Standard No. 14-1976, Standpipe and Hose Systems, are considered in compliance with this standard.

III. AUTOMATIC SPRINKLER SYSTEMS

A. *Design and installation.* Automatic sprinkler systems should be designed by professionals trained in the use of pipe schedules or hydraulic design principles. A reputable sprinkler installation firm can determine the necessary discharge patterns, densities and water flow characteristics for adequate employee safety and should be contracted for such work. Automatic sprinkler systems designed and installed in accordance with NFPA Standard No. 13, Automatic Sprinkler Systems may be considered as being in compliance with this standard. Many workplaces contain automatic sprinkler systems which were designed and installed many years ago in accordance with standards in effect at that time. These systems are acceptable for the purposes of this section, if there is an adequate water supply, piping system, and sprinkler pattern available to assure employee safety.

B. *Maintenance.* Back-up protection for automatic sprinkler systems being repaired may be provided in the affected areas by hose lines, portable extinguishers, partial evacuations, fire watches, or similar preventive measures.

Sprinkler system valves and devices can be protected from damage by enclosing them in cage-type guards or by placing protective barriers around them.

The employer is encouraged to provide a supply of spare sprinklers, of the type used on each system, near the sprinkler valve.

Employers are encouraged to install supervisory control systems on sprinkler systems to alert them of closed valves, loss of air pressure on dry pipe systems or other malfunctions which may affect employee safety.

C. *Water supply.* Auxiliary water supplies include fire department connections, gravity tanks, pumps and a cistern or pond, or a pressure tank.

D. *Protection of piping.* System piping can be protected from freezing by using dry pipe systems in unheated areas. Heating protected areas or insulating piping can protect wet pipe systems from freezing. System piping can be protected for exterior surface corrosion by coating with paint or other coating. Approved corrosion resistant sprinklers are available. Fusible links on sprinklers should not be painted because it reduces their effectiveness.

E. *Sprinkler spacing.* The employer should use the services provided by professional sprinkler system designers to determine what spacings and clearances are necessary to provide maximum protection.

IV. FIXED EXTINGUISHING SYSTEMS, GENERAL

A. *Design.* Fixed extinguishing systems are permanent in their location and installation. They use any of several agents such as dry chemical, foam, water spray, Halon 1211, or Halon 1301. They can be designed for local or total flooding applications. They can be of a customized design for a specific hazard or of a pre-engineered design for more standardized hazard applications.

When the employer selects a fixed extinguishing system to meet an OSHA requirement, the selection should be based on the requirement and the following factors:

1. Size and class of hazard.

2. Employee exposure to the hazard and the agent.

3. Employee safety and health considerations associated with the agent. (See specific agent section.)

Systems which are designed and installed in accordance with applicable national consensus standards may be considered in compliance with the intent of this standard.

B. *Employee safety.* Warning or hazard signs should be posted so that they can be read from a distance of 10 feet or more. For those areas where employees may be trapped due to total flooding systems, the employer is encouraged to provide escape self-contained breathing apparatus of at least 5 minute service life in such areas.

C. *Maintenance.* Employers are encouraged to conduct an acceptance test of all new systems to assure that piping and valves are properly connected. Employers should install supervisory control systems on all major operated valves to better assure the systems are ready for use.

V. FIXED EXTINGUISHING SYSTEMS, DRY CHEMICALS

A. *Design and installation.* The dry chemical systems described in § 1910.161 are designed to discharge a dry chemical from fixed nozzles and piping, or from hose lines by means of an expellant gas. The intent of the standard is to present the design considerations applicable to those systems.

Employers are encouraged to perform acceptance tests on new dry chemical systems by discharging the expellant gas and checking for major gas leaks in the piping and valves.

Dry chemical extinguishing systems installed in accordance with NFPA Standard No. 17, Dry Chemical System, may be considered in compliance with this standard.

B. *Hazards to employees.* Dry chemical fire extinguishing agents are considered nontoxic. However, as with any finely divided material, they may produce mild irritation effects especially when used in an enclosed area. In general, these effects are neither serious nor permanent. For more specific guidance on individual dry chemical extinguishing agent components and their hazards to personnel, the dry chemical manufacturer should be consulted.

VI. FIXED EXTINGUISHING SYSTEMS, GASEOUS AGENTS

A. *Carbon Dioxide*—1. *The agent.* As a fire extinguishing agent, carbon dioxide has a number of desirable properties. It is noncorrosive and leaves no residue to clean up after a fire. Since it is a gas, it will penetrate and spread to all parts of a hazard. It will not conduct electricity and may therefore be used on live electrical hazards. It may be effectively used on practically all combustible materials, except for a few reactive metals and metal hydrides and materials such as cellulose nitrate, which contain available oxygen. Under normal conditions carbon dioxide is an odorless, colorless gas with a density about 50 percent greater than the density of air. Many insist that they can detect an odor of carbon dioxide,

but this may be due to impurities or chemical effects in the nostrils.

2. *Toxicity.* Although carbon dioxide is only mildly toxic, it will definitely produce unconsciousness and death when present in fire extinguishing concentrations. The action in this case is related to suffocation more than to any toxic effect of the carbon dioxide itself. It has been determined by test that atmospheres containing 3 or 4 percent carbon dioxide will cause one to breathe rapidly, but will otherwise have no important effect for relatively short exposures. A concentration of about 9 percent is about all most people can withstand without losing consciousness within a few minutes. At concentrations above 9 percent, personnel would quickly lose consciousness. At concentrations of about 20 percent, death would follow in about 20 to 30 minutes unless the victim was removed to fresh air. Recovery by artificial respiration is usually rapid because of the natural tendency of carbon dioxide to promote breathing. Aside from the normal effect of carbon dioxide causing unconsciousness, it should be noted, that even before this happens, there may be a marked inability to think clearly and to take prompt action. This effect is important because inexperienced personnel may fail to take proper action if suddenly exposed to relatively high concentrations of carbon dioxide.

3. *Employee hazards.* In most cases the actual hazard to personnel is rather slight. The hazard will be greater where the enclosure is large and where carbon dioxide may enter unsuspected areas such as pits or basements. The difficulty of escaping from a given location, and the possibility of reduced visibility because of a discharge of carbon dioxide may also be important factors. In any case, the extent and type of warning to personnel must be designed to meet the particular requirements of each situation.

4. *Employee safeguards.* The steps and safeguards necessary to prevent injury or death to personnel in atmospheres made hazardous by the discharge of carbon dioxide may include the following:

a. Provision for adequate aisleways and routes of exits and keeping them clear at all times.

b. Provision for the necessary additional emergency lighting and directional signs to ensure quick, safe evacuation.

c. Provision for alarms within such areas that will operate immediately upon detection of the fire, with the discharge of the carbon dioxide and the activation of automatic door closures, delayed for sufficient time, to evacuate the area before discharge begins.

d. Provisions for outward swinging self-closing doors at exits from hazards areas, and, where such doors are latched, provision for panic handware.

e. Provision for continuous alarms at entrances to such areas until the atmosphere has been restored to normal.

f. Provision for adding an odor to the carbon dioxide so that hazardous atmospheres in such areas can be recognized.

g. Provision for warning and instruction signs at entrances to and inside of such areas.

h. Provision for prompt discovery and rescue of persons rendered unconscious in such areas. This may be accomplished by having such areas searched immediately after carbon dioxide discharge ceases by trained employees equipped with proper self-contained breathing apparatus. Self-contained breathing apparatus and personnel trained in its use, and in rescue practices, including artificial respiration, should be readily available.

i. Provision for instruction and drills for all personnel within, or in the vicinity of such areas, including maintenance personnel who may be brought into the area, to ensure their correct action when carbon dioxide protective equipment operates.

j. Provision for means for prompt ventilation. Care should be taken to readily dissipate hazardous atmosphere and not merely move them to another location.

5. *Design and installation.* Carbon dioxide systems installed in accordance with NFPA Standard No. 12-1977, Carbon Dioxide Systems, are considered in compliance with this standard.

6. *Acceptance tests.* Employers are encouraged to have an acceptance test performed on all new systems to assure that all components of the system will operate properly.

B. *Bromotrifluoromethane (Halon 1301).*—1. *The agent.* Halon 1301 is a halogenated compound. Discharge of the agent may create a light mist in the vicinity of the discharge nozzle, resulting from condensation of moisture in the air, but the mist rarely persists after discharge is completed. Thus, little hazard is created from the standpoint of reduced visibility.

2. *Toxicity.* The discharge of Halon 1301 to extinguish a fire may create a hazard to personnel from the compound and from the products of decomposition that result from exposure of the agent to fire or other hot surfaces. Exposure to Halon 1301 is generally of less concern than exposure to the decomposition products. However, unnecessary exposure of personnel to either the Halon 1301 or to the decomposition products should be avoided. Undecomposed Halon 1301 has been studied in humans and found to produce minimal, if any, central nervous system effects at concentrations below 7 percent for exposures of approximately 5 minutes' duration. At concentrations of 7 to 10 percent, effects such as dizziness, impaired coordination, and reduced mental acuity become definite with exposures of a few minutes duration; however, these effects are not incapacitating for exposures of one minute or less. At concentrations above 10 percent, these effects increase in intensity and may become incapacitating with exposures longer than one minute. At concentrations of 15 to 20 percent, there is the risk of unconsciousness and possibly death if the exposure is prolonged. Personnel should not attempt to remain in an area following discharge of Halon 1301 in concentrations above 7 percent. It is recommended that they do not remain in an area for more than 4 or 5 minutes even though agent concentrations are below 7 percent. Within the first 30 seconds of exposure to Halon 1301 little effect is noticed, even when concentrations of 10 to 15 percent are inhaled. At these levels, this amount of time appears necessary for the body to absorb a sufficient quantity of the agent to bring about the onset of effects. However, at higher concentrations, the onset of symptoms may occur within a few seconds and, since an individual may be quickly incapacitated by these higher levels, concentrations great than 15 percent should not be used where there is any chance of human exposure. The effects of exposure to Halon 1301 may persist for a short period of time following exposure. However, recovery may be expected to be rapid and complete. Halon 1301 would not be expected to accumulate in the body even with repeated exposures. Anyone suffering from the toxic effects of Halon 1301 vapors should immediately move or be moved to fresh air. In treating persons suffering toxic effects due to exposure to this agent, the use of epinephrine adrenaline) and similar drugs must be avoided because they may produce cardiac arhythmias, including ventricular fibrillation.

3. *Employee safeguards.* The steps and safeguards necessary to prevent injury or death to personnel in atmospheres made hazardous by the discharge or thermal decomposition of Halon 1301 are the same as those for carbon dioxide described earlier.

4. *Design and installation.* Halon 1301 systems installed in accordance with the design requirements of the National Fire Protection Association's Standard for the Installation of Halogenated Fire Extinguishing Agent Systems—1301, NFPA No. 12A-1977, are considered in compliance with the requirements of this Standard.

5. *Acceptance tests.* The employer is encouraged to have acceptance tests performed on all new systems to assure that the system will function properly.

C. *Bromochlorodifluoromethane (Halon 1211)*—1. *The agent.* Halon 1211 is a colorless gas with a faintly sweet smell and having a density about 5 times that of air. The fire extinguishing characteristics are similar to those of Halon 1301, and reference should be made to that discussion for information.

2. *Toxicity.* The hazards to employees from the discharge of Halon 1211 are also similar to those of Halon 1301, but because of the differences in concentrations, the following is presented. Exposure to Halon 1211 and its products of decomposition may be hazardous. Halon 1211 has been studied in humans and found to produce minimal, if any, central nervous system effects at concentrations below 4 percent for exposures of approximately one minute duration. At concentrations above 4 percent, effects such as dizziness, impaired coordination and reduced mental acuity become definite with exposure of a few minutes duration. However, these effects are not incapacitating for exposure of one minute or less. Within the first 30 seconds of exposure to Halon 1211, little effect is noticed, even when concentrations above 4 percent are inhaled. At these levels 30 seconds appears to be the time necessary for the body to absorb a sufficient quantity of agent to bring about the onset of effects. At concentrations on the order of 5 to 10 percent, there is the risk of unconsciousness and possible death if the exposure is prolonged. The effects of exposure of Halon 1211 may persist for a short period of time following exposure. However, recovery may be expected to be rapid and complete. Halon 1211 would not be expected to accumulate in the body even with repeated exposures. The decomposition products of Halon 1211 are the same as Halon 1301 with the addition of some chlorine compounds and acids (HCl, Cl_2, and $COCl_2$).

3. *Employee safeguards.* The safety steps and safeguards for Halon 1211 are the same as those for Halon 1301 and carbon dioxide.

4. *Design and Installation.* Additional design considerations and information can be found in the National Fire Protection As-

sociation's Standard for Halogenated Fire Extinguishing Agent Systems—Halon 1211, NFPA 12B.

Halon 1211 extinguishing systems installed in accordance with design requirements of the National Fire Protection Association's Standard for the Installation of Halogenated Fire Extinguishing Agent Systems—Halon 1211, NFPA 12B may be considered to be in compliance with the design requirements of this standard.

Employers are encouraged to have acceptance tests performed on all new systems to assure that the system is ready for use.

VII. FIXED EXTINGUISHING SYSTEMS WATER SPRAY AND FOAM AGENTS

A. *The agent.* Foam for fire protection purposes is an aggregate of air-filled bubbles formed from aqueous solutions and is lower in density than the lightest flammable liquids. It is used to form a coherent floating blanket on flammable and combustible liquids lighter than water and prevents or extinguishes fire by excluding air and cooling the fuel. It also prevents reignition by suppressing formation of flammable vapors. It has the property of adhering to surfaces, providing a degree of exposure protection from adjacent fires.

B. *Toxicity.* Generally, foams do not present a toxic hazard when used as a fire extinguishing agent.

C. *Employee hazards.* A space filled with high expansion foam is normally not toxic to persons who may be trapped in the space, since the air entrained in the foam is generally not contaminated. However, because of the foam bubbles, some difficulty may be experienced in breathing. Additionally, there is the possibility of the loss of vision and disorientation in the atmosphere of high expansion foam. Because of the potential presence of life safety and injury hazards, entering a foam-filled space should be avoided. When necessary, a coarse water spray may be used to "cut" a path in the foam and personnel should wear self-contained breathing apparatus and a lifeline when entering an area filled with foam.

D. *Design and installation.* Fixed water spray or foam extinguishing systems installed in accordance with design requirements of the National Fire Protection Association's Standard for the Installation of Foam Extinguisher Systems, NFPA No. 11-1976; High Expansion Foam Systems, NFPA No. 11A-1976; or Foam-Water Systems, NFPA No. 16-1974 are considered in compliance with the design requirements of this section.

E. *Storage considerations.* Since all air foam concentrates are water solutions of organic and inorganic chemicals of one type or another, they must be carefully observed for changes in constitution and characteristics. Their storage in shipping containers and in storage tanks must be carried out according to the manufacturer's recommendations. Exposure to extreme heat, cold, contamination, or mixing with other materials must be avoided. Sedimentation or precipitate formation on containers or tanks of concentrate should be carefully checked periodically. The manufacturer or his representative is best qualified to test and determine the extent of reliability of foam concentrates under questionable conditions of deterioration of these liquids.

F. *Acceptance tests.* Employers are encouraged to have acceptance tests performed on all new systems to assure that the system will function properly.

G. *Drainage.* Drainage may be provided with pipe systems above or below ground, curbing, trenches, or ditches. The drainage should carry any overflowing liquids to a safe place away from employees.

VIII. FIRE DETECTION SYSTEMS.

A. *Mounting.* 1. *Locations.* Areas where fire detectors should be mounted include: rooms, halls, storage areas, basements, attics, lofts, spaces above suspended ceilings, inside of closets, elevator shafts, enclosed stairwells, dumbwaiter shafts, chutes, and return air ducts on ventilation systems. Other locations may be necessary depending upon workplace hazards.

2. *Ceilings.* Consideration should be given to ceiling configurations when mounting detectors. Heat and smoke will rise to the highest point inside of a workplace; however, a detector will ordinarily operate sooner if it is nearer to a potential fire source. Generally, height is the most important single dimension where ceilings exceed 16 feet.

b. *Spacing.* Detectors should be spaced in accordance with the manufacturer's recommendations or in consideration of a nationally recognized testing laboratory's recommendation. Reduction of listed spacing may be required for any of the following purposes:

a. Need for faster response.
b. Need for small fire response.
c. Need to accomodate room geometry.
d. Need to consider air movement, ceilings or other obstructions.

C. *Design and installation.* Fixed detection systems designed and installed in accordance with NFPA Standard No. 72e-1974, Automatic Fire Detectors, are considered in compliance with this standard.

IX. EMPLOYEE ALARM SYSTEMS

A. *Purpose.* Employee alarm systems are not necessarily the typical fire alarm pull box interconnected with an alarm gong, bell or horn. In some places the alarm systems may contain a steam whistle, air horns, flashing lights, verbal instructions given either directly or by means of a public address system or a similar means of indicating an emergency. This system may be used to signal not only a fire but also an approaching storm hazard (tornado) or a geophysical hazard such as an earthquake or flood. As long as the signal is recognized by the employees as one indicating a life safety hazard, the system may be multi-purpose.

B. *Testing.* Pull boxes, detectors or other actuating devices may be an integral part of an alarm system. Every actuating device on an alarm system should be tested on a rotational basis to assure their operability. Manufacturer or listing agency recommendations give safe procedures for testing detectors and pull boxes.

C. *Alarm signals.* Employers are encouraged to develop distinctive signals for each anticipated emergency. A single bell, horn or light signal for every emergency can lead to confusion and misinterpretation of the alarm one ring, two rings, one long and one short ring, or something similar for each emergency is an effective method of notifying employees that a specific emergency exists.

X. FIRE BRIGADES

A. *Pre-fire planning.* It is suggested that the local fire department or fire prevention bureau be consulted for additional information which may be helpful in understanding and in the implementation of this section.

A pre-fire plan of the workplace by the local fire department in conjunction with the fire brigade, is encouraged. This will also be valuable for the local fire department in becoming familiar with the workplace and its activities.

B. *Organizational statement.* The organizational statement should include at least the following information: The purpose for which the brigade was organized; intended size of the brigade; number of hours brigade members are to work in relation to brigade functions; type and frequency of training; and duties which are to be performed by brigade members.

C. *Physical qualifications.* Physical qualifications can be determined by such methods as preplacement physical examinations, physical agility tests, and periodic physical reexamination while the employee is a member of the brigade. Employees with coronary or respiratory illnesses should not serve as brigade members performing emergency operations unless permitted by a doctor's certificate.

It is also recommended that brigade members participate in a physical fitness program. There are many benefits which can be attributed to being physically fit. It is believed that physical fitness may help to reduce the number of sprain and strain injuries as well as contributing to the improvement of the cardiovascular system.

D. *Training.* The paragraph on training does not contain specific training requirements because the type, amount, and frequency of training will be as varied as are the purposes for which brigades are organized.

However, it is obvious that brigade members who are expected to perform interior structural firefighting should require training which is more comprehensive and more frequent than those brigade members who are only expected to control or extinguish fires in the incipient stage.

The following recommendations should not be considered to be all of the necessary elements for a complete comprehensive training program; but, the information may be helpful as a guide in developing a fire brigade training program.

All brigade members should be familiar with exit facilities, location and emergency escape routes for handicapped workers, and the workplace "emergency action plan."

In addition, brigade members who are expected to control and extinguish fires in the incipient stage should, at a minimum, be trained in the use of fire extinguishers, standpipes, and other fire equipment they are assigned to use. They should also be aware of first-aid medical procedures and procedures for dealing with special hazards to which they may be exposed. Training should include both classroom instruction and actual operation of the equipment under simulated emergency conditions. This type of training should be conducted at least annually but some functions should be reviewed more often.

In addition to the above training, brigade members who are expected to perform emergency rescue and interior structural fire fighting should, at a minimum, be familiar with the proper techniques in rescue and fire suppression procedures. Training should include fire protection courses, classroom training, simulated fire situations in-

cluding "wet drills" and, when feasible, extinguishment of actual mock fires. Frequency of training should be at least monthly, but some drills or classroom training should be conducted as often as weekly to maintain the proficiency of brigade members.

E. *Protective clothing*—1. *General.* Paragraph (e) of this section does not require all brigade members to wear protective clothing. It is not the intention of these standards to require employers to provide a full ensemble of protective clothing for every brigade member without consideration given to the types of hazardous environments to which the brigade member may be exposed. It is the intention of these standards to require adequate protection for those brigade members who may be exposed to fires in an advanced stage, smoke, toxic gases, and high temperatures.

Therefore, the protective clothing requirements only apply to those brigade members who are performing interior structural fire fighting operations.

Additionally, the protective clothing requirements do not apply to the protective clothing worn during outside fire fighting operations (brush and forest fires), crash crew operations, or other special fire fighting activities.

2. *Foot and leg protection.* Section 1910.165 permits an option to achieve foot and leg protection.

The section recognizes the interdependence of protective clothing to cover one or more parts of the body. Therefore, the option is given so that brigade members may meet the foot and leg requirements by either wearing long fire-resistive coats in combination with fully extended boots; or, by wearing shorter fire-resistive coats in combination with protection trousers and protective shoes or shorter boots.

3. *Body protection.* Paragraph (e)(3) of the section provides an option for brigade members to achieve body protection. Brigade members may wear a fire-resistive coat in combination with fully extended boots; or, they may wear a fire-resistive coat in combination with protective trousers.

Fire-resistive coats and protective trousers meeting all of the requirements contained in the NFPA 1971-1975, Protective Clothing for Structural Fire Fighters are acceptable as meeting the requirements of this standard.

4. *Hand protection.* The requirements of the paragraph on hand protection may be met by protective gloves or a glove system. A glove system consists of a combination of gloves. The usual components of a glove system consists of a pair of gloves, which provide thermal insluation to the hands, worn in combination with a second pair of gloves which provide protection against fire, abrasion, puncture, and absorption of liquids.

5. *Head, eye, and face protection.* The paragraph of the standard concerning head protection requires ear flaps to be provided with the protective head device so that they will be available if needed. It is recommended that ear protection always be used while fighting interior structural fires.

Many head protective devices are equipped with face shields to protect the eyes and face. These face shields are permissible as meeting the eye and face protection requirements of this paragraph as long as such face sheilds meet the requirements of § 1910.133 of the General Industry Standards.

Additionally, full facepieces of breathing apparatus meeting the requirements of § 1910.134 and paragraph (f) of § 1910.165 are also acceptable as meeting the eye and face protection requirements.

6. *Respiratory protective devices.* Since brigade members may be exposed to smoke and toxic substances while performing interior structural firefighting operations, it is imperative to assure maximum protection against facepiece leakage.

The use of a combination type self-contained breathing apparatus where the apparatus can be switched from a demand to a positive-pressure mode is also acceptable as long as the apparatus is in the positive pressure mode when performing interior structural fire fighting operations. Also acceptable are approved respiratory protective devices which have been converted to the positive-pressure type when such modification is accomplished by competent persons using kits or parts approved by NIOSH and provided by the manufacturer and by following the manufacturers' instructions.

The employer is encouraged to provide brigade members with an alternative means of respiratory protection to be used for emergency escape purposes if the self-contained breathing apparatus becomes inoperative.

Alternative means of respiratory protection may be either a buddy-breathing device or an escape self-contained breathing apparatus (ESCBA). The ESCBA is a short-duration respiratory protective device which is approved only for emergency escape purposes.

It is suggested that if ESCBA units are used, that they be of at least 5 minutes service life.

Appendix C—References for Further Information

I. *Appendix general references.* The following references provide a vast amount of information which can be helpful in understanding the requirements contained in all of the sections of Subpart L:

A. *Fire Protection Handbook,* National Fire Protection Association; 470 Atlantic Avenue, Boston, MA 02210.

B. *Accident Prevention Manual for Industrial Operations,* National Saftey Council; 425 North Michigan Avenue, Chicago, IL 60611.

C. Various associations also publish information which may be useful in understanding these standards. Examples of these associations are: Fire Equipment Manufacturers Association (FEMA) of Arlington, VA 22204 and the National Association of Fire Equipment Distributors (NAFED) of Chicago, IL 60601.

II. *Appendix references applicable to individual sections.* The following references are grouped according to individual sections contained in Subpart L. These references provide information which may be helpful in understanding and implementing the standards of each section of Subpart L.

A. § *1910.157. Portable fire extinguishers:*

1. *Standard for Portable Fire Extinguishers,* NFPA 10; National Fire Protecton Association, 470 Atlantic Avenue, Boston, MA 02210.

2. *Methods for Hydorstatic Testing of Compressed Gas Cylinders,* C-1; Compressed Gas Association, 500 Fifth Avenue, New York, NY 10036.

3. *Recommendations for the Disposition of Unserviceable Compressed Gas Cylinders,* C-2; Compressed Gas Association, 500 Fifth Avenue, New York, NY 10036.

4. *Standard for Visual Inspection of Compressed Gas Cylinders,* C-6; Compressed Gas Association, 500 Fifth Avenue, New York, NY 10036.

5. *Portable Fire Extinguisher Selection Guide,* National Association of Fire Equipment Distributors; 111 East Wacker Drive, Chicago, IL 60601.

B. § *1910.158. Standpipe and hose systems:*

1. *Standard for the Installaton of Sprinkler Systems,* NFPA 13; National Fire Protection Associaton, 470 Atlantic Avenue, Boston, MA 02210.

2. *Standard for the Installation of Standpipe and Hose Systems,* NFPA 14; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

3. *Standard for the Installation of Centrifugal Fire Pumps,* NFPA 20; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

4. *Standard for Water Tanks for Private Fire Protection,* NFPA 22; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

5. *Standard for Screw Threads and Gaskets for Fire Hose Connections,* NFPA 194; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

6. *Standard for Fire Hose,* NFPA 196; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

7. *Standard for the Care of Fire Hose,* NFPA 198; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

C. § *1910.159. Automatic sprinkler systems:*

1. *Standard for the Installation of Sprinkler Systems,* NFPA 13; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

2. *Standard for the Care and Maintenance of Sprinker Systems,* NFPA 13A; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

3. *Standard for the Installation of Standpipe and Hose Systems,* NFPA 14; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

4. *Standard for the Installation of Centrifugal Fire Pumps,* NFPA 20; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

5. *Standard for Water Tanks for Private Fire Protection,* NFPA 22; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

6. *Standard for Indoor General Storage,* NFPA 231; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

7. *Standard for Rack Storage of Materials,* NFPA 231C; National Fire Protection Association, 470 Atlantic Avenue, Boston MA 02210.

D. § *1910.160. Fixed extinguishing systems—general information:*

1. *Standard for Foam Extinguishing Systems,* NFPA 11; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

2. *Standard for Hi-Expansion Foam Systems,* NFPA 11A; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

3. *Standard on Synthetic Foam and Combined Agent Systems,* NFPA 11B; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

4. *Standard on Carbon Dioxide Extinguishing Systems,* NFPA 12; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

5. *Standard on Halon 1301,* NFPA 12A; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

6. *Standard on Halon 1211,* NFPA 12B; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

7. *Standard for Water Spray Systems,* NFPA 15; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

8. *Standard for Foam-Water Sprinkler Systems and Foam-Water Spray Systems,* NFPA 16; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

9. *Standard for Dry Chemical Extinguishing Systems,* NFPA 17; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

E. § *1910.161. Fixed extinguishing systems—dry chemical:*

1. *Standard for Dry Chemical Extinguishing Systems,* NFPA 17; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

2. *National Electrical Code,* NFPA 70; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

3. *Standard for the Installation of Equipment for the Removal of Smoke and Grease-Laden Vapor from Commercial Cooking Equipment,* NFPA 96; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

F. § *1910.162. Fixed extinguishing systems-gaseous agents:*

1. *Standard on Carbon Dioxide Extinguishing Systems,* NFPA 12; National Fire Protection Association, 470 Atlantic avenue, Boston, MA 02210.

2. *Standard on Halon 1301,* NFPA 12B; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

3. *Standard on Halon 1211,* NFPA 12B; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

4. *Standard on Explosion Prevention Systems,* NFPA 69; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210

5. *National Electrical Code,* NFPA 70; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

6. *Standard on Automatic Fire Detectors,* NFPA 72E; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

7. *Determination of Halon 1301/1211 Threshold Extinguishing Concentrations Using the Cup Burner Method;* Riley and Olson, Ansul Report AL-530-A.

G. § *1910.163. Fixed extinguishing systems—water spray and foam agents:*

1. *Standard for Foam Extinguisher Systems,* NFPA 11; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

2. *Standard for High Expansion Foam Systems,* NFPA 11A; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

3. *Standard for Water Spray Fixed Systems for Fire Protection,* NFPA 15; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

4. *Standard for the Installation of Foam-Water Sprinkler Systems and Foam-Water Spray Systems,* NFPA 16; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

H. § *1910.164. Fire detection systems:*

1. *National Electrical Code,* NFPA 70; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

2. *Standard for Central Station Signaling Systems,* NFPA 71; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

3. *Standard on Automatic fire Detectors,* NFPA 72E; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

I. § *1910.164a. Employee alarm systems:*

1. *National Electrical Code,* NFPA 70; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

2. *Standard for Central Station Signaling Systems,* NFPA 71; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

3. *Standard for Local Protective Signaling Systems,* NFPA 72A; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

4. *Standard for Auxiliary Protective Signaling Systems,* NFPA 72B; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

5. *Standard for Remote Station Protective Signaling Systems,* NFPA 72C; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

6. *Standard for Proprietary Protective Signaling systems,* NFPA 72D; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

J. § *1910.165. Fire brigades:*

1. *Private Fire Brigades,* NFPA 27; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

2. *Initial Fire Attack, Training Standard On,* NFPA 197; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

3. *Fire Fighter Professional Qualifications,* NFPA 1001; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

4. *Organization for Fire Services,* NFPA 1201; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

5. *Organization of a Fire Depaartment,* NFPA 1202; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

6. *Protective Clothing for Structural Fire Fighting,* NFPA 1971; National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

7. *American National Standard for Men's Safety-Toe Footware,* ANSI Z41.1; American National Standards Institute, New York, NY 10018.

8. *American National Standard for Occupational and Educational Eye and Face Protection,* ANSI Z87.1; American National Standards Institute, New York, NY 10018.

9. *American National Standard, Safety Requirements for Industrial Head Protection,* ANSI Z89.1; American National Standards Institute, New York, NY 10018.

10. *Specifications for Protective Headgear for Vehicular Users,* ANSI Z90.1; American National Standards Institute, New York, NY 10018.

11. *Testing Physical fitness;* Davis and Santa Maria. *Fire Command.* April 1975.

12. *Development of a Job-Related Physical Performance Examination for Fire Fighters;* Dotson and Others. A summary report to the National Fire Prevention and Control Administration. Washington, DC. March 1977.

13. *Proposed Sample Standards for Fire Fighters' Protective Clothing and Equipment;* International Association of Fire Fighters, Washington, DC.

14. *A Study of Facepiece Leakage of Self-Contained Breathing Apparatus by DOP Man Tests;* Los Alamos Scientific Laboratory, Los Alamos, NM.

15. *The Development of Criteria for Fire Fighters' Gloves; Vol. II: Glove Criteria and Test Methods:* National Institute for Occupational Safety and Health, Cincinnati, OH. 1976.

16. *Model Performance Criteria for Structural Fire Fighters' Helmets; National Fire Prevention and Control Administration, Washington, DC. 1977.*

17. *Firefighters;* Job Safety and Health Magazine, Occupational Safety and Health Administration, Washington, DC. June 1978.

18. *Eating Smoke—The Dispensable Diet;* Utech, H.P. *The Fire Independent,* 1975.

19. *Project Monoxide—A Medical Study of an Occupational Hazard of Fire Fighters;* International Association of Fire Fighters, Washington, DC.

20. *Occupational Exposures to Carbon Monoxide in Baltimore Firefighters;* Radford and Levine. Johns Hopkins University, Baltimore, MD. *Journal of Occupational Medicine,* September 1976.

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